

# AVIATION WEEK

MAY 4, 1953

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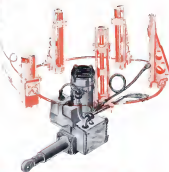


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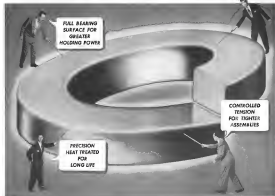
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## NEWS DIGEST

### Domestic

**Harold D. Dewey, Jr.**, was dragged by President Eisenhower last week, as Civil Aeronautics Board vice chairman.

**Robert B. Moore, Jr.**, Commerce Department Undersecretary, is studying recommendations of 19 carriers as he is comparing Civil Aeronautics Administration and Treasury notes of its functions back to airline management.

**Frank H. Lee** was sworn in as CAA administrator last week, by Commerce Secretary Stephen Weeks.

**Delta-Chicago & Southern Air Lines** merger was completed and the two companies started operating as one carrier last week.

**Airlines Reform Committee** of New York's Queens borough proposed last week that residents of the suburban area and the Port of New York, Authority for a total of \$20 million, give tag along by the group for "air rights" over houses in the vicinity of La Guardia and Idlewild International Airports.

**Navy's P-1V1** Turbo Compound Super Constellation was restricted briefly to low altitudes after exhaust gases blew into rear fuselage during recent high-altitude tests, causing turbine overwork. Solution probably involved tighter clearances between air and gases.

**First CAA-approved** runway extension approach lights are in operation at San Francisco International Airport.

**Two pilots** of a four-man crew survived the crash of a Beechcraft Bonanza due to engine C-46 in Washington's Cascade Mountains Apr. 23, 10 days after a *Miles* Airlines DC-3 went down in the same area and killed six.

**Leslie O. Barnes**, former director of operations, Air Transport Co., is now president of Allegheny Airlines. Robert M. Love, former president, has been elected chairman of the board. Barnes joined Allegheny last February.

**American Meteorological Society's** award for outstanding aviation service was presented to Harry F. Claiborne, Port Washington, N. Y., last week for "establishing the first aviation meteorology club network in America."

**Fiftieth anniversary** of powered flight observances are scheduled to start this week in cities throughout the U. S.



**BOLKO VON RICHTERFERN**, right, a leader of World War I German ace, gets informed information on the Republic P-44 Thunderbolt fighter-bomber from Maj Gen Thomas Lanham, Chief of

Staff USAF Group (see left) during a recent visit to an American base. Von Richter was one of a group of 20 Germans, including World War II Luftwaffe officials, invited to inspect U. S. facilities at Langhelf.

**Harry J. Gorman**, 47, former *American Airlines* pilot, died Apr. 22 at Ft. Worth, Tex.

### Financial

**United Aircraft Corp.**, East Hartford, Conn., estimates that deposits made during the first quarter of 1953 totaled \$300 million, including common stock earnings of 51 1/2 per share. UAC deposits for the same period last year were \$145 million, or savings of \$1 07.

**Trans World Airlines** has made a \$2-million sinking fund and interest payment deposit on loans from the Republic Life Assurance Society, reducing the original \$40 million due to \$24,250,000.

**American Car & Foundry Co.**, New York, has purchased the capital stock of Avco Instrument Corp., Farmington, N. J., producer of electronic systems.

**Columbia Airlines** profits for the first quarter of 1953 total \$14,000, compared with a \$139,000 loss for the first three months of last year. Profits for the 12 month period that ended Mar. 31, 1953, add up to \$36,000.

**Northwest Airlines** ended the first quarter of this year with a net loss of \$657,665, compared with a loss of \$1,306,147 for the same period of 1952. Operating revenues total in all time high of \$12,343,766, topping \$10,554,500

reported for the first quarter of 1952.

**California Eastern Airways**, Oakland, Calif., reports a net income for 1952 of \$230,582, nearly double the 1951 total of \$114,284.

**Air Express Division**, Railway Express Agency, reports gross revenues last year totaling \$52,364,835, a gain of \$4,699,190 over 1951 revenues of \$47,665,645.

**Paischild Engine & Airplane Corp.**, Hagerstown, Md., has declared a dividend of 23 cents per common share.

**Delta Air Lines** directors have voted a 23-cent quarterly dividend to stockholders of record as of May 15.

### International

**Jet transports** will be built to subsonic speeds of 500-600 mph. For some years in come, because high fuel consumption would outweigh any economy in air mileage, says Sir Frederick Harland Page, chairman of Handley Page, Ltd.

**British European Airways** has grossed at its 27th annual report of Victoria Valerius (Belmont) because seats were working loose from cabin desks.

**Canadian Defense Minister Brooke Claxton** says his country will spend \$77 million this year for production of the CF 100 two jet fighter and \$65 million for the F-86E.

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**Aviation Week**  
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## Rudder Trim System on Republic's F84F *Airborne actuated*



The R-244-M14 LINEATOR® Electric Linear Actuator is specified equipment on Republic's new sweptwing F84F Thunderstreak. This actuator features radio noise filter, neutral light switch, positive mechanical stops, and externally adjustable position limit switches.

For complete information about LINEATORs and other Airborne electromechanical actuators, see our literature in the Institute of the Aeronautical Sciences 1953 Engineering Catalog.



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STARFIRE SPORTS NEW NOSE—A pointed elliptically shaped nose radome, as fitted to this Lockheed F84C, has replaced the rounded radome fitted on earlier Starfires (Aviation Week Apr. 27, p. 34). Lockheed engineers developed the new configuration after 36 months research.



## New Views Of Aircraft In the News

**BATTLEGROUND OVERHAUL**—An F86 Sabre of the 4th Fighter Interceptor Wing gets a new General Electric J67 engine at a forward air base somewhere in Korea. Sighting the fuselage behind the swept wings amplifies combat area interest.

**ITALIAN LIGHTPLANE TESTED**—News 1 (top below) is a prototype of a new personal plane powered by a 75 hp. Walter Mikano engine. Top speed is 124 mph. The craft has a empty weight of 740 lb. and carries 1,120 lb.

**PANTHER, BRIDLE**—Four Messerschmitt PW-4 Panthers (Alison III) VMF-314 flew 2,000 ft. in one month on most Caribbean sea crossings.





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## WHO'S WHERE

### In the Front Office

**G. S. (Ted) Hunter, Controller.** At Lanes, your present expenditure is the one that's new: very positive maintenance, repair, saving and operations, taking over the additional duties of Harry C. Short, who is resigning recently.

**C. Har Miller, Director** and general manager of Pacific Helicopter Corp., has been elevated a director of Private Jetcraft Co., Glendon Heights, Pa.

**G. W. Nelson, assistant manager** of Pacific Northern Airlines, and Paul Penick, New York leader, are new directors of PNA.

### Promotions

**Robert H. Eshbrook, director** emeritus of the Trans World Airlines system, after several years has been named editor of the *Wash Times* (D-C) Post editorial page.

**D. F. Fisher** has been elected controller and **G. T. Bess** has been promoted to treasurer of Consolidated Value Aircraft Corp., San Diego, Calif.

**Karl W. Dalton** has been appointed public relations director of American Airlines, succeeding Joseph D. Kyle, who resigned to become executive vice president of the Federation for Aeronautics Program.

**Harold C. Winkler** has been elected treasurer of Lombard & McMillan, Inc., Encinitas, Calif. Other promotions: Robert D. Haddock, pilot manager and Paul Winkler, chief manager of the independent's Radio Division.

**Lloyd Kelly** has been named general sales manager of Link Aviation, Inc., Englewood, N. Y. Gene Bond has been appointed Washington (D-C) district manager, and A. E. Williams is new government sales manager.

**Robert M. Buey** has been named assistant director of technical development at Boeing Aircraft Co. Wichita. Boeing has made three appointments in the new Pratt & Whitney Aircraft Division: Richard Nelson, production manager; R. E. Berthel, general manufacturing manager; Lewis Elmer, process coordinator. Ben Delaney, factory shop superintendent, and Clyde Pittman, testing manager.

### Changes

**Ed, Col. John F. Stapp**, who recently retired as USAF major, has assumed the office of general manager on the human body, has been named chief of the AF Space Biology Laboratory, Holloman Air Development Center, Alamogordo, N. M.

**Max Joseph Eger (Jr.)** has joined Gamma Corp., New York, to represent development of voltage and frequency control.

**W. R. Hefewe** is new electronic pilot system in guided missile development at Chance Vought Aircraft Division, Stratford, Conn.

**James L. Haggerty, Jr.** has resigned as military editor of *American Aviation*.

## INDUSTRY OBSERVER

► **Republic Aviation** is conducting a market survey to determine military interest in a twin jet executive type turboprop capable of cruising at 500 mph. It would carry up to 16 passengers, be powered for speeds to 45,000 ft. and will fit under S-1 airlifts. Present design thinking is based on using J65 (Shuttle) engines, but Republic also is reported to be considering General Electric J47s.

► **Westinghouse J46** turboprop has made its first flight powering a Chance Vought F7U-3 Cutlass. The J46 is scheduled to replace the Alouette J35 now being used in early model Cutlasses and the J35 new being used in the General NFV-3 Indians fighters. Both the Cutlass and Sea Dart will have twin J46 installations.

► **Vought** has received a Navy letter of intent to build an additional number of A-1H attack versions of the Cutlass (Aviation Week Nov. 18, 1972, p. 18 and Apr. 30, 1972, p. 11). The A-1H will be powered by a pair of J46 jets and will be used by Navy carrier air groups and Marine shore-based squadrons.

► **Sabena Belgian Airlines** shortly will purchase three Sikorsky S-55 helicopter for use as an international helicopter passenger and mail service linking Brussels, The Hague, Rotterdam and Lille.

► **Aircraft industry** is moving rapidly to investigate an extremely aluminum compound developed by the Battelle Memorial Institute in a substitute for germanium now used in transistors and rectifiers. Bell Telephone Laboratories already have obtained preliminary from the Battelle Mining Co. of San Francisco, owner of a major U. S. aluminum smelt and refinery and sponsor of the Battelle investigation. RCA, Hughes Aircraft, Sperry and Clevite also have approached Battelle for assistance.

► **Several engine makers** are considering installation of magnetic tape playback units to provide night-light background vision for passengers. A small unit specifically designed for airline use with a two-hour tape supply will shortly be marketed by Ampex Electric Co. of Redwood City, Calif.

► **A Russian night fighter** group equipped with new twin jet aircraft previously designated the Mig-17 is now operating out of Metcheng Airbase near Halle in the Eastern Zone of Germany. The new fighters resemble the Mig-17 in general configuration but are powered by two jet engines under the fuselage with engines ending just above the tail fin edge of the wing. The Mig-17 is not believed during the day, operates only at night, and are back behind closed hangar doors before dawn.

► **Boeing Aerospace Co.** has a 45-passenger jet helicopter project (H-66) on the drawing board. The H-66 will have stub wings and feature two turboprop plus concepts on the rotor tips.

► **Redox metal bonding process** passed a rugged test in the recent Kestrel Conquest competition. Inspection of the Conquest revealed that Redox joints stood up well as the explorers that followed the tiltrotor craft. Conquest parts are being shipped back to England for further technical inspection.

► **British helicopter industry** is getting little support from the military services. Orders for only 20 military helicopters—10 for Navy and 10 for the RAF—are now on British books. First British acquisition of operational military helicopter was made up of Sikorsky H-19 obtained under the Mutual Security program and is now in service against the Communists in Malaya.

► **Vickers Viscount** has completed its cold-weather trials in Canada for Trans Canada Air Lines and returned across the North Atlantic to England, thus becoming the first turboprop-powered aircraft to make a successful trans-Atlantic roundtrip.

## Defense Budget

Defense Department has been submitted to the National Security Council for study and final action before submission to Congress early this month. Actually, Defense Department submitted several budgets based on the variable programs for peace, cold or hot war, and is keeping final decisions to the Security Council. For example, USAF portion of the budget reflected three alternate plans: one to continue the present 141-wing program, another with a 915-wing program bringing heavy cuts in transports and troop carrier groups, and a third with a base minimum of 506 groups about evenly split between Strategic Air Command and Air Defense Command with tactical as discussed and military air transport cut to the bone.

## Industrial Policy

White House sources indicate there will be no drastic industrial policy change to narrow the base of industrial mobilization and defense production, but there will be some reduction in areas where the military has overestimated its requirements and extremely high cost production on certain nonmilitary consumer items. Basically the Marshall-Lavett policy of building a broad industrial base for defense requirements capable of meeting full mobilization requirements will be accepted by the Eisenhower Administration, but Defense Secretary Wilson will be given authority to trim fat all its edges.

## NATO vs. Air Guard

A political storm is brewing because USAF alleges it requires NATO with modern aircraft at the expense of the Air National Guard. National Guard units which are now returning from federal service—some of them from Korea and Europe—are being re-equipped with F-51 gun-powered fighters because all available jet aircraft are being shipped off to NATO countries. Reports from Europe indicate many NATO countries have no U-2 jet planes than they have qualified pilots and are not supplying pilot training quotas allocated them in USAF schools.

Meanwhile, ANG pilots, most of whom flew jet during their federal service, are being pushed back into obsolete piston fighters. USAF has supplied about 1,200 Republic F-51 jet fighters to European countries and is now shipping Thunderbolts to Chinese forces in Formosa. Large numbers of Lockheed F-80 jet fighters also have been shipped abroad, but ANG pilots are now forced to use the F-47 trainer of World War II vintage.

Questions have been raised by politically powerful ANG supporters. Does it make sense to have American-built jet fighters used like an ill-used fleet of World War II vintage, combat-seasoned USAF pilots now in the ANG are forced to fly obsolete piston fighters and trainers?

## Atomic Air Strategy

Basic NATO strategy for the defense of Western Europe is based on the use of an air power delivery "body" whose bases against Russian ground forces, according to Gen. Alfred M. Greengard, chief of staff of SEAFAC. Gen. Greengard told the Senate Foreign Relations Committee that NATO expects to use its ground forces only

to force the Russians to concentrate their ground troops sufficiently to offer good targets for tactical Atomic.

USAF already has and the F-54G, standard NATO fighter-bomber, is equipped to deliver a tactical atomic bomb. Navy also has several carrier-based aircraft, including the McDonnell B-46 (F2H-2B) and the Douglas Skyraider (AD-4B), equipped for the same job.

## Growing Red Threat

Gen. Greengard also testified that Russian strength is increasing both in the air and on the ground. He said the Russians are modernizing their air force and the effectiveness of their 170 divisions had been increased considerably during the past few years. He said the Russians now have 100 major airfields in Eastern Europe with 200 satellite fields. This compares with 40 NATO fields now operational and 60 more planned for completion during the next 15 years.

## Symington Warning

The warning followed shortly on the heels of another bid by Sen. Stuart Symington, former USAF Secretary, who told the American Society of Newspaper Editors that Russia has increased its lead over the United States during the past three years in submarine, aircraft and ground forces.

Symington and the Russians now have more jet bombers than the United States, and more jet fighters "of superb technical quality" than all the United Nations now possess, and warned that all evidence pointed to the Russians continuing to increase their lead in aircraft and at the same time approaching parity in quantity of atomic weapons.

## Comet Problem

British are now maneuvering to get the question of manufacturing certificates for the Comet 3 jet transport removed from the Civil Aeronautics Administration-Air Registration Board technical level and handled on a diplomatic not technical level by the British Foreign Office and the U. S. State Department.

## Balboa Case Stymied

The New York-South American route interchange problem cannot be a still existing dot at the White House with Panagra, Pan American and Eastern Air Lines all seeking a reversal of the CAB ruling. The board denied the interchange agreement on ground that it would create three direct routes against two existing lines—National and Braniff. The direct, which requires governmental approval, has been in the White House for more than a year—under both Truman and Eisenhower.

## Aircoach Promotion

Past of Oakland gives credit to CAB member Joseph Adams for helping to avert a close congressional vote approving a \$10-million bond issue to improve its airport. Five days before the vote Adams made a strong speech warning the expansion of air travel through low-cost aircoach service that made headlines in the local papers.

—Washington staff

## Senators to Probe Military Plane Buying

• Procurement faces close scrutiny in Congress.

• New committee may urge faster air power buildup.

By Katherine Johnson

A Senate subcommittee of the Senate Armed Services Committee has been quickly organized to launch a sweeping investigation of the aircraft program of all the services.

Headed by Sen. Styles Bridges, the group includes Republican Sens. Ralph Flanders and James Duff and Democratic Sens. Henry Flood Byrd and Stuart Symington, former Secretary of the Air

The Bridges subcommittee is an outgrowth of a three-man group—Bridges, Flanders, Byrd—appointed earlier to look into the letting of a C-119 contract to Kaiser-Frazer Corp. for production at Willow Run.

Unit cost on production of the cargo transport at the Chrysler plant of Fairchild Engine and Airplane Corp., which developed it, is only \$253,000, Bridges pointed out, compared with a cost of \$1.2 million for the first C-119s produced at Willow Run.

Bridges questioned the advisability of incurring high costs in operating second and third production sources. Off to a slow start, this investigation still is underway.

• Air Power Aspects—The enlarged investigating subcommittee has not yet charted its course in detail. But, in addition to investigating such revealed subjects as efficiency, waste, and duplication in procurement, it is expected to probe for the sources to air power aspects of those quantities raised in testimony by Senate Minority Leader Lyndon Johnson.

• Does an aggressive nation have the planes and weapons with which the U. S. can be attacked at any and every point? • Does an aggressive nation have a stockpile of atomic bombs that could be used to strike at every American city?

• Do we have a defense force adequate to best off an attack?

• Do we have a force that could deliver devastating counter-blows against any enemy or have new ideas in this respect that is obsolete?



Sen. Styles Bridges



Sen. Ralph E. Flanders



Sen. Stuart Symington



Sen. Henry Byrd

• "Is our military doing large enough to keep pace with the building of the program, or should we be building more?"

The new subcommittee is likely to fill a role similar to that of Johnson's Propulsion Investigating Subcommittee of the last Congress, which prodded the Administration for a specific buildup of air power and blasted the "batter instead of guns" thinking that settled in Washington with the Vietnam in Korea lightening.

Symington reportedly has posed questions similar to Johnson's in public

speeches throughout the past two months. With no lack of making interest in defense, and the strong support and guidance of political vet Sen. Johnson, Symington is likely to emerge as a key member of the new subcommittee.

Johnson-Symington teamwork dates back many years. It was Johnson, then a senior member of the House Armed Services Committee, who picked up the case of Symington, then USAF Secretary, for a 76-wing USAF program in 1949 and succeeded in selling it to the committee's chairman, Rep. Carl Vin-



Sen. James P. East

son. The result: Despite Senate opposition, Vreese and Johnson succeeded in getting congressional approval of the program. Later, Vreese, as chairman of the National Security Resources Board, and Johnson, as chairman of the Preparedness Investigating Subcommittee, worked closely to push through legislation. Johnson's influence undoubtedly was a factor in this approval of Vreese's in the new investigating subcommittee.

Other members of the new group have divergent interests likely to detract from their participation in the secret investigation.

- **Belmont** is chairman of the Appropriations Committee, a true congressional job, and President Dwight D. Eisenhower has been very vocal in his opposition to the importance of air power and undoubtedly will keep his hands on the steering wheel of the new subcommittee.
- **East** was a member of the Johnson preparedness group, not coming in its recommendations. He opposed studies in USAF funds for procurement, research and development, and operations last year.

- **Friedson**, a former business executive and banker, has specialized in economic matters on Capitol Hill, actively participating in the office of the President Committee on Joint Economic Conference. He's followed the line that a sound economy is the best defense. He even voted last year for all proposals for cuts in USAF expenditures.

- **Duff**, a newcomer to the Armed Services Committee this year, hasn't participated in defense matters and will not participate in his new role as a member of the Senate Investigating Subcommittee. He's been active in the Small Business Committee, which has perked the more military contracting and subcontracting.

- **Byrd**'s activities as chairman of the

Committee on Non-Federal Federal Expenditures, senior member of the investigating Finance Committee, and leader of workers' political forces, occupy much of his time. His main interest is in the money side of the defense effort.

- **Frankfurter**, Appointed Establishment of the Investigating Subcommittee reports to be a veteran for Minority Leader Johnson. At the time Johnson raised his questions on the adequacy of U. S. defense—when it was well known that Defense Department was considering a \$56 billion program for air defense, he urged the appointment of such a group.

- **Chairman Leverett** Subcommittee of the Armed Services Committee put the name to President Eisenhower: "Recent statements . . . indicate that there is concern, either that our defense program is inadequate, or that it is not being carried out properly." Subsequent exposure doubt about setting up a congressional investigating committee and proceeding on to determine the adequacy of the U. S. defense program.

The President's reply discouraged that, pointing out that the National Security Council is reviewing the status of the nation's defense.

"I am concerned," Eisenhower wrote Subcommittees, "by your statement that you do not seem to move confidently into the debate held at this time, while this process of examination and refinement is still in progress." Congress demonstrated to assure that the defense program is soundly conceived and administered, the President commented, "is shared by the Executive Branch."

## Boeing Jet Transport To Cost \$4 Million

Boeing Aircraft Co.'s first commercial jet transport will be ready for airline operation by late 1957, two cost plans already known.

James W. Bostick, chief cost engineer, and sales director Ralph L. Bell estimate the selling price of Boeing's four-jet, single-engine aircraft at \$4 million.

However, Bostick says Boeing is making an effort to cut transport prices by "taking the costs for increased cost and differentiating basic principles which will result in lower cost which would through into the experimental production phase."

Bell revealed only these details:

- Operating costs will be "in the same ball park" as current piston-powered transports.
- Structure and aerodynamic philosophy of Bostick's machine and lower jet engines will be embodied into the new aircraft.

Bell says the prototype will be completed and test flown at the Boeing test facility in Seattle late in the summer of next year.

- **Current Competition**—Both Boeing and Bell say U. S. airlines are not ready yet to accept in transportation "jet" service. "Before we can show them what they want is to get," (The American World Airways has ordered three de Havilland Comet 3s, and Eastern Air Lines president E. R. Rickenbacker tried unsuccessfully but was to get early delivery of the British plane.)

"We don't think any airline want to get into jets until they are forced by competitors," the Boeing officials say. Chief per President Bostick on the Boeing transport's planned speed of more than 500 mph, its altitude adjusted price will be 20% less per pound than that of similar 30 years ago, Bostick says.

"The price we have developed for the jet transport comes to 11.5 cents per pound of weight empty per mile per hour versus more than 15 cents per pound per mile per hour as 1931," he says. "That is an reduction of 26% in price per pound on empty pounds."

- **Boomer Program**—Bostick calls Boeing's economic program—outlined in his report at the Society of Automotive Engineers annual aeronautical meeting at New York—on issues to changes by William Littlewood, American Airlines vice president, suggesting that "estimated price tag for U.S. jet transport is 'no great deal of reality or of any kind or kind to do the job' (American Week Dec. 22, p. 17).

- **Boeing's chief cost accountant says the program will:**
  - Increased tending to insure designs will not progress too far before their structure and aerodynamic soundness is secured.
  - Production and tool planning to decrease both recurring and nonrecurring costs.
  - Manufacturing production supplies to ensure standard and low-cost manufacturing.
  - Finding new quality control and inspection procedures to improve efficiency.
  - Training, personnel to increase production skills.
  - Setting cost targets.

Bostick says they airlines could cut costs of jet transports by following a "recent principles":

- Material changes from basic specifications.
- Eliminate all but the most minor variations.
- Cut out of approved components.
- Standardize design and parts.
- Pool purchases of aircraft and spare parts.
- Deliver spare parts monthly to prevent component production with planes.

## New Air Policy

• Defense Undersecretary outlines Wilson plan.

• Also hits 'unrealistic' mobilization schemes.

By Robert Hott

Assurance that the security industry will be maintained on a healthy state and not allowed to deteriorate as it did after World War II was given last week by Undersecretary of Defense Homer H. Kees in the first major policy speech by a key member of the Republican defense team headed by Defense Secretary Charles E. Wilson.

Kees assurance to the industry came in the course of a speech to the U. S. Chamber of Commerce in which he:

- Outlined the first rough blueprint of Wilson's approach to solving defense problems.
- Dismissed a blistering attack on the military leadership's handling of post-Korean production expansion, labeling it as "unrealistic requirements, poor planning and inflated estimates."

Base points to Wilson's current approach to defense problems, it outlined by Kees include:

- Sweeping review of military planning and the current industrial mobilization.
- Revision of outmoded and inefficient military procurement policies and practices.
- Elimination of highest production from the defense production program.
- Developing a stronger civilian management team with potential business experience to aid level of "unrealistic" military planning.

Communicating to the secret industry, Kees said:

"It is important that we give careful consideration to maintaining, more as it can be partially achieved, the health of industries particularly vital to national defense which do not have full opportunity to show in civilian production. The secret industry is a principle of this type."

"We must avoid for these and for the good of the entire . . . a shadowless industry as they recognized after World War II. A careful proportion of requirements over a period of time and time comparative before and after the war the Defense Department will be necessary to achieve that goal."

- **Critical of Military**—Kees was bitterly critical of military planning during the Korean war, which he attributed to a "lack of industry cooperation with the government figures for requirements and the unrealistic schedules with which



Homer H. Kees

they were confronted by the military. Planning, tools, equipment and facilities were to be based on three theoretical projects.

"With this much of order came the drive for an industrial mobilization have founded upon the same theoretical calculations. Industry turned to the task of doing its best to meet the production targets set by the military."

"Then came the period of so-called cutbacks, stretchings and program changes which had the effect of having the unrealistic planning (clearly to the possibility of realistic accomplishment). Excessive paper targets were piled before the realities of the situation. Even today there are huge areas of capacity allocated to be spent for items which have not yet been fabricated nor will they be for some time."

"Unrealistic requirements, poor planning and inefficient creation of an industrial which the short span of time to come, waste of money, poor utilization of equipment, unnecessary duplication of efforts from the civilian economy and the inefficient use of tools, manpower, equipment and facilities."

"Then, too, when delays became abundant the industry, after also being afflicted by shortages and conditions with many times more waste produced than not in security. For example, I was told the current capabilities of a year's supply of oiling machines."

- **Cuts Military Waste**—Kees emphasized that the training of military industrial personnel in a coordinated approach to industrial and procurement planning. He said that American industry had produced and delivered twice as much military output as Europe in 1945, according to the military figures in that theater in World War II. He said one recent military mobilization plan called for half good production

valued at \$530 billion when total U. S. total goods production for 1953 was only \$14 billion. "To take the military plan would have taken the total capacity of American industry six years, according to Kees."

- **Base Policy**—Kees indicated that there would be no escaping dimensions of several seasons in reviewing the industrial mobilization issue. He stressed the importance of keeping peak lines of defense production (pointing in many facilities that peak production requirements had been fulfilled. He indicated that the reason of the industrial mobilization issue will be a delicate process aimed at working out highest production and production of defense for which the military could establish, various requirements and briefing items where requirements had been underestimated and more production capacity was required.

He stated an emergency plan requires action to be included in the revised industrial mobilization issue.

- **It is essential** that the agencies have the management and industrial knowledge required to efficiently and successfully accomplish the production task to be assigned.

- **It must have available facilities and equipment**, or by reasonable addition to existing facilities have the capacity support both in quantity quality and adequacy.

- **It should be sufficiently well financed** so that it will need only to implement its capital and not expect to rely solely on support on the various forms of government assistance.

- **These must be a sufficient resource of management with the ability and skill** to carry out for the industry.

- **Based on the nature of the equipment** to be produced, no facility should be established which falls below the requirements of a maximum economic production rate.

"An organization should not be given more defense business than it can handle efficiently. It is a generally accepted principle, depending upon the type of business that a company can and maintain more than three or four times its civilian dollar volume in military production."

Kees also indicated that all of the industry survey and studies of the Defense Department have failed to solve any basic problems of the Pentagon and "have perhaps only added to the confusion."

## C&S Reports Top Salary

Salary A. Stewart, president of Chicago & Southern Air Lines, Memphis, Tenn., received \$16,317 salary and \$2,000 in additional perquisites during 1953, the airline reported to Securities & Exchange Commission this week.



# Congress Fights Airport Cuts

Republicans and Democrats challenge Administration plans to hold up airfield aid pending study of program.

The largest on Capitol Hill over the Eisenhower Administration's plan to send \$50 million from the fiscal 1956 budget to aid airport development is growing, and seems showdown soon to be ahead before the vote is divided. The Administration is setting up a commission to study all civil aviation progress and formulate policy on federal assistance to state and local governments. It wants any demands on the airport program postponed until this is accomplished.

Both Republicans and Democrats are going as quickly challenging this move. They feel it may be years before a federal-state relations policy can be worked out successfully and that, in the meantime, airport development should go on.

Pressure on Congress is heavy from local governments with fiscal 1955 projects allocated by the Budget Bureau's fiscal cuts, as well as critics that have raised a total of \$75 million in matching funds for airport development. Of the approximately 170 projects authorized by Civil Aeronautics Administration for \$10 million total spending in current fiscal year, 45 totaling \$5.5 million have been authorized so far.

A plan to hold up aid pending on Congress is not appealing to detail where the \$50 million would be spent has been (see p. 25).

The current outlook.

House Appropriations Committee has opposed Administration's recommendation, thinking out the \$30 million for airports in the Commerce Appropriation bill. But a showdown on the floor is likely when it comes up for debate this week.

Senate Appropriations Committee is expected to allow at least part of the \$50 million in airport development to continue during the coming year.

Meanwhile, yielding to congressional pressure, Undersecretary of Commerce for Transportation Robert Murray is continuing spending on the screen and asking Congress for supplemental appropriation for airports in the middle of fiscal 1954 (beginning of calendar 1954).

New CAA administrator Fred Lee is in the middle of the Administration-Congress fight. As acting administrator, Lee supported the \$50 million in very strong case. The \$14.1 million provided for airport development for fiscal 1955, in testimony last March before the House Appropriations Committee.

"The expression that has and will take place is both military and civil aviation," he testified, "and the airport, hence, however and most diversified aircraft support that leads . . . is necessary to avoid having deficiencies in service."

before determines to the use and development of U. S. as power."

So a result, Lee took the form of congressional criticism of the Administration's decision to cut out new airport money. For a time, this criticism delayed his approval as administrator by the Senate Interstate and Foreign Commerce Committee.

Congressional interest in the issue was demonstrated when 14 of Senate Commerce Committee's 15 members turned out for Lee's confirmation hearing, simply to examine the airport out.

Here in view of the development at the Commerce Committee session and at Appropriations Committee's use on CAA's budget.

Senate change challenged the Administration's budget to call off an airport development, pointing out that Congress has passed legislation authorizing a \$50-million program extending through fiscal 1951. It also has approved projects funds for it. Sen. Warren Magnuson declared, there will be an airport program next year regardless of what the Administration does. Lee said Sen. John McClellan's statement was appropriate, he would be "willing to see that it was properly done."

Lee agreed that the federal program "in years when it has been at sufficient size, has done quite a lot to stimulate airport development." But when the size is reduced to the \$14.1 million level of the current fiscal year, the administrator said, "there is serious question whether the program is adequate or a detriment to airport construction, since the amounts for individual projects are so small as to accomplish little." There is some feeling in Congress and the Administration that if the program was completely called off, attention now working there then for a federal grant would most favored with construction on that one.

Lee took no responsibility for the original \$50-million recommendation or the subsequent recommendation to eliminate it. He said he served only as a "staff capacity" in drawing up the \$10 million program. Decision to eliminate was "strictly an Administration decision" and he was not involved in it, Lee said.

The CAA administrator endorsed the Administration's decision to "hold a breathing period" on the airport program that he believed and its future thoughtfully reviewed. But he declined to comment himself on whether he thought it should be "what is 'an Administration policy matter,' he said, involving relations between federal and state governments and federal policy on transportation aid.

"If the cities are going to have to build their own airports," Sen. Magnuson objected, "what control is the federal government going to have over

## MIG Price Tag: \$100,000 Delivered

Indication apparently has hit the American market for Russian-built MIG-15 jet fighters. Gen. Mark Clark has offered \$100,000 and political opinion in the first Communist pact who delivers a MIG-15 aircraft to United Nations forces in Korea and \$50,000 to any pilot who delivers one therewith.

USAF planes are pushing the offer campaign by dropping leaflets with the offer over North Korea. Private intelligence officers report that an offer made three years ago by USAF in Europe by a Czech pilot to deliver a MIG-15 met for \$50,000

and the promise of personal political asylum.

The Czech was a former Luftwaffe fighter pilot who had flown German jets and was a mid-air crash at a Russian base in East Germany when he regularly stole MIG-15s from Russians to dispatch them to a USAAF general in Europe. He reportedly captured the offer that was in 1950 before the MIG-15 had appeared in Korean combat. Now the military is offering 10 times the Czech's price and three years later USAF does not have a single MIG-15.

- Myotis is in France
- Hantons in Belgium and The Netherlands
- F-86s in Italy

Assembly line planning started almost immediately after the contract was signed at a meeting of NATO members last week, claiming nearly a year of negotiations between the United States and member nations of the West Europe defense forces.

The combined European aircraft production program is expected to put 1,500 jet fighters into operation with western air forces by the end of 1956. The U. S. is backing the program with \$25 million in additional procurement orders, and European governments are putting up almost no capital cost.

- Ready to Roll—Assembly line in Great Britain are expected to get going quickly. France is expected ready to roll, and production at the Manly Duxford Ministry 2 already has started. Denmark will start in the spring. 4 in the U. S. is a backlog of orders for the Meteor 2 has been filed.

Almost output in the three other nations—The Netherlands, Belgium and Italy—are expected to take longer. But NATO officials hope the production rate will show substantial progress by the end of this year.

- Production breakdowns:
  - Great Britain: U. S. Air Force has contracts totaling \$400 million for British production of the Hawker Hunter U. S. Navy order for the Hawker Sea Hawk amounted to \$13 million. Britain ordered Vickers Supermarine Swifts under a \$70 million contract.
  - France: The U. S. placed \$56 million in orders for the Meteor, and French government contracts for Myotis (see p. 19).
  - Netherlands and Belgium: The U. S. let contracts totaling \$15 million with The Netherlands and \$24 million with Belgium for second-source production of the Hawker Hunter. Belgium will produce North-Rover Avon engines, and Fokker will build fuselages in Holland. The Netherlands and Belgium together will spend \$17 million for licensed production of the Hunter.
  - Italy: United States is expected to award Fiat a \$20-million contract for production of the North American F-86D. Details of this contract are not available yet, but approval is expected soon. The Italian aircraft firm originally planned to produce North-Rover Avon engines for the Hunter.

Clustering planes for NATO members to be put into country production march forward. The U. S. is expected to start the job of 1956 to set up production of the Hunter, a status that could be achieved a year earlier with the F-86D.

## NATO Orders Five Jet Fighter Types

(McGraw-Hill World News)

Paris—Aircraft plants in Western Europe began looking up last week for orders for five jet fighter types. The North Atlantic Treaty Organization countries totaling more than \$550 million.

- Hawker, Sea Hawk and Swift in Great Britain

## The Lion's Share

(McGraw-Hill World News)

London—The British aircraft industry will get \$155 million from the U. S. and a healthy income in royalties from other North Atlantic Treaty Organization countries under defense purchase contracts signed recently in Paris.

Recent deals are \$140 million for 450 Hawker Hunter F-1 jet fighters, all of which will be delivered to the U. S. ordered by June 1956. The U. S. Navy is spending \$15 million in Britain for 100 Hawker Sea Hawks, scheduled for delivery within the next two years. The Royal Air Force already has ordered 500 Hunters.

The Netherlands and Belgium together will spend \$17 million to set up production of the North American F-86D. Details of this contract are not available yet, but approval is expected soon. The Italian aircraft firm originally planned to produce North-Rover Avon engines for the Hunter. Clustering planes for NATO members to be put into country production march forward. The U. S. is expected to start the job of 1956 to set up production of the Hunter, a status that could be achieved a year earlier with the F-86D.

## Report Air India Orders Comet 3s

Bombay—Air India International Ltd. reportedly has ordered two de Havilland Comet 3 jet transporters for 1957 delivery. The carrier's previous aircraft purchases have been from Lockheed. It is believed that the Comet deal does not affect Air India's current order for three Lockheed Super Constables.



## EDO TESTS DUAL HYDROSKI DEVELOPMENT

First phase of a German RUF Group (modified by Edo Corp., College Point, N. Y.) to test a dual hydrofoil configuration for Navy as part of a hydrofoil-based jet vessel program. This boat is similar to that fitted to the new German S-100 jet tank frigates. The actual profile on the hull, mounted on shock absorbers, allows the hull, possibly unaided hydrodynamic

lift, when moving under water, holding the upstroke out of the water at comparatively low speeds and eliminating the plowing drag associated with conventional airplanes. Edo's Edo and Navy tests have shown that hydrofoil project gives best performance in much smaller water than the conventional flying boat hulls are capable of handling.

## Tough Props

- Shot-up Aeroprops bring pilots back in Korea.
- Steel-blade design gets credit for ruggedness.

Aeroprop's Allison Division, General Motors Corp., is getting its impressive photo collection of badly shot-up propellers that brought their pilots back in Korea. The Aeroprop is standard equipment on the lucky Douglas AD Skyraider attack-bombers, which have been carrying loads back to the Korean Red installations with regularity from U. S. Navy carriers.

The design of the Aeroprop blade, a steel forging with a central longitudinal rib supported by a sheet of steel bonded to the forging, gets credit for the strength which has made it possible that the shot-up blades to come back, still capable of performing their normal mission.

Here are three propeller case histories:

• Probably most spectacular demonstration by an Aeroprop as an AD was flown by Eugene Bill Duggett of Detroit, Tex. He brought his Skyraider back more than 100 mi. to a UN landing strip in South Korea after a bombing mission in which his prop was hit by a 37-mm anti-aircraft shell. The plane was purchased as 185 photos. Accompanying photo (top) shows Duggett at right standing by land through the hole in the Aeroprop to remove a conventional handshake from his cockpit. Lt. Gerald Harry McClellan, Attack Squadron 145, from the USS Kearsarge (CVA 17).

• Lt. Gerald Harry McClellan took a 37-mm shell through his Aeroprop in his fourth bombing run on Haeju (railroad bridge). He didn't discover it, Navy reports say, until he had landed back on the USS Princeton. Photo (middle left) shows McClellan with the pierced blade.

• Lt. (jg) Robert Natta's Skyraider had an 18-in. long section shot out of its Aeroprop by a hit hit in a low-level attack over Wonsan, Korea. The hit landed into the trailing edge, carved deep into the center rib section.

The Aeroprop also is used on the Grumman F4F Corsair, built for the Navy and now being used in the fighting in Indo-China for close air support operations.

Aeroprop's steel counter rotating propellers now in production will be used in the Douglas A3J, advanced version of the Skyraider, and on the North American XAJ. Neither of the latter planes is in production.



### THEY GOT HOME

Graphic examples of battle-damaged Aeropropeller propellers that held together and enabled their pilots to make it back home are shown in the photos above. The center of right shows inside details of these propellers.

Top photo shows Douglas Skyraider propeller purchased by 17-mm cannon shell that left a hole large enough to put a man's arm through.

At left center is another prop pierced by a 37-mm shell, while next to it is a prop that had 18 in. of its trailing edge sheared off.

Hollow-blade construction of a typical Aeropropeller propeller is shown at right. Note the longitudinal strengthening rib.



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more powerful and flies on twin swept wings. It carries 2,800 more pounds of payload than its closest twin-engine transport. Ceiling and range are greater. Passenger and freight loading are easier, quicker. And along with its improved performance, the Douglas R4D-8 still

contains DC-3 reliability with twin-engine reserves.

Development of the R4D-8 is another example of Douglas leadership in aviation. Plans that can be produced in quantity in its faster and better with a longer payload are a true Douglas rule.



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### Foreign Aircraft Gasoline Needs (Excluding Iron Curtain countries)

(In thousands of barrels)

	1952	1953	1954	1955	1956	1957	1958
Western Hemisphere	8,207	8,180	9,780	14,880	11,000	11,150	14,000
Europe	10,155	11,300	12,730	12,800	11,900	11,500	13,000
Eastern Hemisphere	9,231	9,530	9,900	14,450	14,400	14,900	11,400
Total Europe							
Hemisphere	19,435	20,010	21,680	27,450	22,400	22,760	21,400
Total Europe							
Hemisphere	27,613	28,930	33,390	52,830	33,300	34,100	35,400

### Avgas Demand Exceeds Supply

Most aviation gasoline production facilities are located in the Eastern Hemisphere this side of the Iron Curtain to supplement peacetime plants, which cannot maintain increasing demands abroad, Deputy Petroleum Administrator J. Ed Watson reports.

Petroleum refining facilities have expanded throughout the Eastern Hemisphere, Watson says, but construction of plants for production of aviation gasoline have lagged far behind.

Previous Administration for Defense officials in Washington believe the demand for aviation gasoline will continue to remain steady at least for another five years. Then it is expected to level off for the next decade as the tank is made from piston-powered aircraft to jet.

Western Demands—In the Western Hemisphere outside the U. S., JAF officials expect the tank to get to be slower, as that aviation gasoline demands will continue to rise throughout the next ten years.

This year, European daily consumption of aviation gasoline alone is esti-

mated at 31,000 barrels. By 1955, it will be 32,000 barrels per day, 32,300 barrels in 1957 and about 27,400 barrels in 1962, experts report. Consumption in the Western Hemisphere, outside the U. S., should be 25,000 barrels a day this year, officials say, 28,500 barrels in 1955, 31,600 barrels in 1957 and 35,400 barrels in 1962.

Experts—Production of aviation gasoline outside the U. S. as of Jan. 1 amounted to only a little more than 18,000 barrels a day. Foreign requirements for 1955 average about 32,000 barrels a day. The deficit will be made up through exports from this country.

Caribbean countries, Mexico and Canada are producing nearly 12,000 barrels a day, while 4,300 barrels are produced daily in the Far East. The United Kingdom manufactures roughly 2,500 barrels a day at the present time.

JAF reports that no new facilities are known to be planned for production of aviation gasoline despite the prospect of an increasing demand in Europe and the Eastern Hemisphere at least for the next five years.

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TYPED TRIANGLE of the Vulcan's wing reveals important details of structural layout, shows layout of various controls.

## Avro Vulcan: Evolution of a Delta Bomber

- Analysis of Great Britain's super-priority, four-jet triangle-wing plane shows why it is what it is.
- Speedy, high-flying, far-ranging 698 reaps benefits of design of its forerunners, the 707 series.

By David A. Anderson

The sleek white Avro Vulcan, fastest delta-wing bomber, is the pride of the Hawker Siddeley Group and the heart of British conventional circles.

Now in tripartite production for the Royal Air Force, the Vulcan has been widely touted as the world's best bomber, carrying highest loads faster, farther and at higher altitudes. It has also been credited with giving Britain the lead in delta-wing planes.

**Right or Wrong?** These statements aren't exactly wrong, but they aren't exactly right, either. The novelty of the design, its uniqueness and dramatic performance at Farnborough last fall and the accolades of "super-priority"

have contributed to a building of the airplane encased within correct areas, say for any other type except the Concorde B 56.

But Delta was Vulcan, a flying ace, and nearly every other British military type and those civil transports enjoy the superpriority rating and the air was held in that only about two dozen Vulcans are going to be built anyway.

Further, the plane is not yet a bomber (yet) in the B-16, if you define a bomber as an offensive weapon as well, and other British firms have claimed the "tougher, faster, further" label for their own.

As for the British lead in delta, there could be considerable argument from the many U.S. proponents of the de-

sign, with Convair—who did it first—leading the list.

But there is no denying that the Vulcan is an impressive achievement in a rough design requirement. It stands as a tribute to the objective engineering and management teams that saw the delta as their answer and had the courage to push it through from drawing boards to flight tests.

**The Vulcan**—When Avro's big white delta made its last flight over the heads of an amazed crowd at Farnborough last September, only a couple of hours flying time had been run up on the plane. Yet Avro—and the Vulcan's pilot, Roland Peto—had complete confidence in the behavior of the plane.

That was only the first indication that there was a tremendous amount of research and development behind the Vulcan. Viewing it, observers usually only see the purpose of the little 707 acres of flight-test data, and recognized the value of the air base located in the Avro Ashton high-strate research center.



DOCKET CLIMPT indicates use of spinnable capsule in place of traditional spinnable web. Note boundary layer separator and ribbed wing configuration.



IN PROFILE, the unusual "buckin" appearance of the Vulcan comes from the sweep under the tailboots and the straight lower line of the delta wing.

In spite of its 100-ft wingspan, the Vulcan is deceptively small in appearance. Its agility and speed, added to the low altitude at which Peto made the bulk of his flight demonstrations, belittled that impression.

Most of the detailed information on the Vulcan is still on the secret list. But it has been reported that the plane weighs over 180,000 lb and that production Vulcans will have Bristol Olympus turbojets replacing the Rolls-Royce Avons of the experimental job.

**Independence**—Beyond that data, it is necessary to go to the many photographs of the Vulcan for more of its characteristics.

The wing geometry of the Vulcan is based on approximately 45-deg sweep angle of the leading edge. The trailing edge is not straight leading to tip, but bends forward at the inboard engine bay. The wingtip do not curve to a point following the triangular layout,

but are chopped off parallel to the airplane centerline a few feet in from the tip.

Two pivot control surfaces extend along the wing trailing edge from just inboard of the bay region to the tip. Inboard, they are elevators, and the outboard pair are ailerons.

Each control surface is divided in half along its chord, in spite of the obvious division, no picture shows either section of a single surface working independently of the other. Leading edge of these sections is at about the 50% chord line on the inboard end, and at about 60% chord at the outboard.

If 100 ft is reasonably accurate for the wing span, then the aileron span is 17 ft, and the elevator span is 19 ft. If 100 ft is not correct, then those figures can be thought of as percentages of span.

Three feet of the inboard engine bay at 7 ft from the airplane centerline, the outboard pair is 12 ft from the centerline. This checks approximately with photos of the Vulcan taken from orbit.

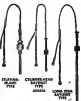
On the same basis as the above estimates, the bomb bay is about 25 ft long, and about 7 ft wide. Loading gear fixed is about 31 ft. The harrier diameter is about 5 ft.

**Other Features**—Pivot actuators are mounted above and below the Vulcan wing over the engine bays. These resemble a plate held flat against the wing

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**Surface-Mount** type with 1/8-28 thread base. Resistance of spinnable ADR-10.

**Cylindrical-Sensor** type has probe dimensions similar to the free-air type. Resistance of spinnable ADR-10 and 1/8-28 thread base. Ambient and pressure compensation. Resistance of spinnable ADR-10.

**Core-Sensor** type built with 1/8-28 thread base. Resistance of spinnable ADR-10 and 1/8-28 thread base. Ambient and pressure compensation. Resistance of spinnable ADR-10.

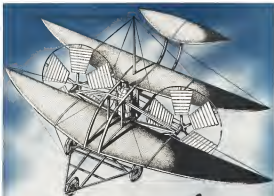
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including thin wingback wings and low wing loading in various configurations.

► **Bomber Work-**Set for high speed, required for the bomber aircraft that a wingback wing layout would weigh more than Dornier felt could be afforded, this would have reduced the payload and so the concept was ruled out. They thought of eliminating the tail and using the wingtips of the swept wing for control. By getting rid of the tail, its weight and drag were saved, but the structural penalty of the swept wing was still too severe.

So the design team considered other layouts for about a month, using as data some designs for the Strikmaster II, a civil jet transport which never materialized, and German tunnel tests on sweptback. The team shifted away at the height of the swept wing by 50° towards delta studies. They reduced the span, compensating for that effect on sweep, thickness and wing area.

Devies states: "... We reduced the weight by reducing the span, and, so that reduced the area, which we didn't want to do, we put the area back by filling in the space between the swept back wing and the fuselage. The result of all this logical thinking was the delta."

► **Backings-**At the stage, Aero magazine recent took the plunge and backed the proposal for a transonic craft to the Air Ministry. Through 1947 the design team worked on the official specification of the Type 688, and by fall of that year the Air Staff and Ministry of Supply had the facts and figures of the new design.

By the end of 1947, the road was headed down to go ahead and build a prototype. "It was a bold decision," says Davies, "and I believe the Air Staff at that time showed insight in recognizing the high performance in their requirements, and courage in placing the order when so previous delta-wing aircraft had flown."

Because of the lack of information on the flying characteristics of such radically different planes, Aero proposed to the Ministry of Supply that some small test research planes be built. They were given the go-ahead and began design of the 707 series in 1947.

By September 1949 the fact of these, the Aero 707, was in the air for the start of a short life. It crashed soon after, and pilot and plane were lost.

The second plane, the 707B (American Wings Oct. 9, 1950, p.20), flew in time for the 1950 Farnborough display, and the third 707, the A, flew for the 1951 show. Both these airplanes are still on the air, and flew again with the Valiant at 1952's SBAC flying show.

Devies and that these planes paid their way, very few changes—most of them major ones—were made in the

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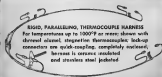
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699 as a result of test flights of the T67.

► To the Beecher-During 1948 most of the present group was involved with the busy design of the T67, but some men were working on the big brother. By the end of 1949 the cockpit mock-up was completed. In the spring of 1950 the dimensions of the Type 674 were finalized, and the first story was made in preparing a production line.

Now the work had really begun. About 100 technical designers worked out the specialized subassemblies which were part of the overall plan, and 100 craftsmen started the detail drawings.

In 18 months, the 699 was completely built. "That's really quite a short time in which to build a prototype of such a sophisticated aircraft," says Davies.

The Aero factory built the true duplicate for the 1952 SEMG show. On Aug. 16 that year the big bomber, with Richard Felt flying, lifted off the blacktop runway at Woodhull, around the trees bordering the field and roared off over the hills of Chatham.

A few days later it whirled above the runway at Farnborough, a white triangle contrasting with the brilliant blue T67B and orange T67A.

► What Next—Sir Ray Davies, Aero's chief, has said that the company is working on a jet transport version of the Vulcan, in addition to its production effort on the bomber. There has been a lot of interest overseas in a delta-wing transport, based on considerations of usable internal space and noise. The best bet is that Aero would use the wing, plus a lengthened fuselage, to meet the passenger requirements of a transport.

Meanwhile, the first prototype is picking up flight time, and the second prototype is being completed at Aero's Chatham plant. There is a good chance that the second Vulcan will break Olympic records for power aloft by at Farnborough this fall.

Below its normal gross weight (a most big aircraft by at Farnborough) and only 40,000 lb. it flies to show it through the sky, the second Vulcan should be one of the fastest planes in the air. With maximum gross weight (which might climb to 114,000 lb. to give the design jet its moment) it should still be a first-class performer.

During the next couple of years, the Vulcan will test staff competition from the Handley Page Victor and the Welton Vulcan at a later development of this plane.

The first outcome of the pending RAF evaluation of the three types can't be predicted now, but whatever it is, Aero's design team will always be credited with leading a tough job, doing it well, and producing one of the world's outstanding aircraft.

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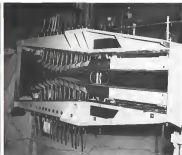
This wide application in aircraft sheet metal structures where a simple, flush, removable plate is required. The flush access doors are removed by a simple quarter turn to release and an additional quarter turn raises door out of circular cutout as panel.

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FLANKING THROAT of Tunnel E-4, first operating, test unit of the AF's Arnold Engineering Development Center, is opened by 24 jacks above and below nozzle shape.

## Aro Gets 3,500-mph. Windtunnel

A 12-ft-dia. atmospheric open-jet windtunnel, first test unit to be completed at the Air Force's Arnold Engineering Development Center, Tullahoma, Tenn., has been turned over to Aro, Inc., operating agency of AFDC. The tunnel is capable of speeds between 1,000 and 3,500 mph. It is one of several such wind tunnels included in the design of the Gas Dynamics Facility, which is being a series of three major units comprising the center.

Tunnel test work will not begin for an estimated three months, the period until then will be spent in modification and calibration of the unit.

► **Base Data-Tunnel E-4**, the new test rig is designated, is an atmospheric radial type, where the air is drawn through the tunnel and into an evacuated sphere at the downstream end.

Test speeds are determined by the shape of the flexible nozzle (seal) upstream of the test section by a pair of metal rings. Cross-section of these rings are adjusted by means of a series of 24 jacks.

Currently, atmospheric air is used, passed through a temporary duct. Such a duct can be extremely large because it has to handle all the air it is passed into the tunnel. In contrast, a tunnel with upstream high-pressure storage, such as Tunnel E-1 will eventually have—can get away with a smaller and cheaper duct because the air can be

drawn as it is being stored. Storage, of course, takes place at a much slower rate than does using the air during a test.

► **History—Design** contracts were proposed by Aro in November 1950, and three months later was approved for construction. In June 1951, construction was expedited so that testing could be started earlier.

Test section of Tunnel E-4 is similar to that installed at the Jet Propulsion Laboratory at the California Institute of Technology, but the design has been modified by Aro to give a maximum speed about twice that of the original.

Total cost of this portion of the Gas Dynamics Facility is estimated at \$470,000.

## Women Engineers Give Merit Award

Elizabeth G. McGill, Canadian structural engineering consultant, received the 1953 award for meritorious contribution to engineering from the Society of Women Engineers at its recent national convention in New York.

Miss McGill was chief structural engineer for Canadian Civil and Forestry Co. before the war, and during the war years was in charge of engineering for production of Hawker Hurricanes and Curtiss SBAC Mustangs built in Canada.

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## Titanium Tests

- Ryan studies new uses in aircraft structures.
- Trials include high-speed air-friction heating.

Ryan Associates Co. is studying new processing and application potentials of titanium and its alloys in sheet form for the Navy and Air Force.

For the Navy, the work will be to evaluate the material for aircraft structural applications. The Air Force contract is geared to determine best production techniques for the plant.

• **Navy Work**—Under the Ryan contract, Ryan is building various structural components which it will test under temperature and high load conditions to obtain performance data for comparison with similar parts made up of aluminum alloy and steel. Components to be fabricated and evaluated will include:

- Aerial sections which would be subjected to air-friction heating in a high-speed tunnel or other type of comparable facility.
- Spine or bulkhead component which would be located near the engine as stabilization and thus be subjected to temperature effects.
- Plate-stringer combination tested above temperature alloy a better.
- Air Force Work—Ryan's Air Force studies will check titanium and titanium alloy sheet properties in these operations:

- Cutting, including sawing, shearing, blanking and grinding.
- Forming with punch press, drop hammer and rolling at various temperatures. Cold forming also will be studied.
- Welding, including fusion and all types of resistance welding.
- Shop jobs such as drilling, stamping, covering and clamping.

Phase two of the contract will include the production of a pilot run of parts embodying these processes. Ryan's development laboratory will test some of the parts under actual and simulated service conditions and will check such factors as sublimation characteristics under exhaust gas exposure at various temperatures and galling and scoring in exhaust system, slip-joint and overhaul applications.

• **Earlier Progress**—Titanium is fast new to Ryan associates. The company began study of the metal in 1957 at its own expense. It fabricated complex shape extrusions—forms for the Pacific HUP-1 and one of these components has been put through several hundred hour testing so that high temperature effects could be analyzed.



TITANIUM sheet is formed on Ryan's Econ stretch press with heated die.



EXHAUST sheet sections made of the heat-resistant alloy are expected, thus...



ASSEMBLED in fabrication on "hull" engine used in Pacific's HUP-1 engine.

## AVIONICS



GE HIGH TEMPERATURE junction transistor (left) and power transistor (right) "picked up" by transistorized receiver (left).

### IRE Convention Hears Hiss . . .

## New Transistors Beat the Heat

This may bring their avionics use closer; meeting also gets report of Avionic study on tube reliability.

By Philip Klus

Several new transistor developments of interest to avionics equipment designers made their debut at the recent national convention of the Institute of Radio Engineers in New York City. Among these were units with improved heat resistance and heat-dissipation properties.

Also of avionic interest was a quantitative report on military tube reliability, details of the new MIL specifications for aircraft power supplies, a report on optimum statistical layouts in space-diversity communications systems, and disclosure of two new Air Force ground position navigation computers.

Attendance at the convention was 15,000, up 20% from last year.

**Transistor Displays**—A variety of "transistorized" equipment, most of it experimental, went on display at the Waldorf-Astoria in what was called "the first industry-wide transistor exhibit."

General Electric, Radio Corp. of America, Raytheon Mfg. Co., Bell Telephone Labs and the Signal Corps Engineering Labs participated.

Included in the exhibit were transistorized transmitters, receivers, a test oscillator, hearing aids, a telephone auto selector, a video amplifier, a fre-

quency meter, and a Grange counter with a transistor power supply.

**New Developments**—New transistor developments of special interest to the avionics industry included:

• **High-temperature transistors**. General Electric demonstrated its new "p-p" junction transistor which can be operated at temperatures as high as 100°C. Previous transistor temperature limit of 75°C or lower has hindered device's use in avionics equipment.

• **High-power transistors**. RCA engineers described two new techniques which increase a transistor's ability to dissipate externally generated heat and thereby permit a 16- to 30-fold increase in power rating.

• **Hybrid transistor**. A double based junction device which exhibits such control characteristics in certain types of circuits, such as a sawtooth generator, was described by two GE engineers.

Bell Telephone Labs studies were reported which show that point-contact type transistor failures and "aging" are due to entrance of moisture and can be eliminated by improved hermetic sealing.

• **GE Avionic Interest**—Many of the more than 125 technical papers presented during the four-day convention had applications to the avionics field.

Of particular interest were papers which described:

• Results of static tube reliability study, based on analysis of tube failures in a variety of military equipment.

• New MIL spec for power supplies, from which avionics equipment will be operating in the future.

• Results of space-diversity tests, which indicate that 600 ft is optimum as range spacing for HF communications.

• New A-1 and AN/APA-96 ground position indicators, automatic dead-end warning computers for use in military air craft.

• **High Temp Transistor**—General Electric demonstrated the high-temperature characteristics of its new p-p junction transistor in a novel test. The test uses water functioned as an oscillator as a small solid transistor and was connected in such a way that the transistor was submerged in continuously boiling water (100°C). A tape recorder played through the transistor transistor and was picked up in a nearby transistorized table model radio.

The new high-temperature transistor was developed by GE under military contract. Limited quantities of the new unit will be available in a few months, GE says, with mass production scheduled for then fall.

Although GE released an official performance data on the new device, a performance curve, previously for the circuit under demonstration, drawn on the display background showed a total variation of power gain of less than 30% over a temperature range of -50°C to 100°C.

• **Cooling Transistors**—Dr. L. D. Armstrong of RCA described two new techniques which his company has developed to improve a transistor's internal heat dissipation, enabling it to operate at higher power levels.

One method is to encase a transistorized transistor element in a tiny metal tank which has been filled with a cooling liquid. The liquid, which must have good dielectric properties and a high boiling point, circulates within the tank and transfers heat from the transistor element to the metal tank and then to the surrounding air.

The other technique Dr. Armstrong described calls for putting the transistor element in a small metal can to which external cooling is conducted from the water to the metal can through a solid connection and, in turn, radiated from the cooling fan.

Using these techniques, RCA says, transistors normally rated at about 0.25 watt can be operated at one watt without deterioration. If air and water is available around the metal can, units can be operated at up to three watts, RCA test show.

• **Hybrid Transistor**—Dr. I. A. Lasker

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HEAVE DECAPITATION of RCA transistor is completed by making three or six in mounting cooling fins on case.



TRANSISTORIZED video amplifier (right) made by Bill Labontea is not much larger than household switch (left).

QF, described a germanium diode with a double base which exhibits special control characteristics of proper biasing is applied to the p-n junction.

Dr. Leck described a new south geosynchronous satellite with a double-bridged diode which exhibited very linear characteristics from a few cycles per second to several kilocycles per second. Dr. Leck described a new south geosynchronous satellite with a double-bridged diode which exhibited very linear characteristics from a few cycles per second to several kilocycles per second. Dr. Leck described a new south geosynchronous satellite with a double-bridged diode which exhibited very linear characteristics from a few cycles per second to several kilocycles per second.

Dr. B. M. Ryder of Bell Labs said: "The described studies aimed at tracking down the cause of failure and stable life span (American Wire Nov. 24, 1952, p. 11).

Bell Lab analysis showed that water vapor seeping through the plastic encapsulation was responsible both for slow deterioration and "sudden death" types of failure, Dr. Ryder said.

Sudden failures were caused by moisture seeping from the weaker support.



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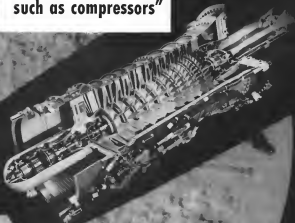
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Westinghouse is investing millions of dollars and man-hours to help build American jet-propulsion leadership. Jet engines are produced at South Philadelphia and Kansas City plants by Westinghouse, America's Jet Engine Pioneer.

11080-4



*As one shows in one half of the cutaway drawing of a Westinghouse jet engine compressor, the structure of steel threaded stator blades mounted in threaded grooves in a steel shroud housing. The other half shows stator blades mounted in a steel shroud housing.*

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Receiver	AY-500-1	AY-500-2	AY-500-3	AY-500-4	AY-500-5	AY-500-6	AY-500-7	AY-500-8	AY-500-9	AY-500-10
Control	AY-500-1	AY-500-2	AY-500-3	AY-500-4	AY-500-5	AY-500-6	AY-500-7	AY-500-8	AY-500-9	AY-500-10
Indicator	AY-500-1	AY-500-2	AY-500-3	AY-500-4	AY-500-5	AY-500-6	AY-500-7	AY-500-8	AY-500-9	AY-500-10
Transducer	AY-500-1	AY-500-2	AY-500-3	AY-500-4	AY-500-5	AY-500-6	AY-500-7	AY-500-8	AY-500-9	AY-500-10

\*All values are typical. Actual values may vary by as much as 10% from typical.

## AY-500 (PYGMY) SERIES

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Receiver	AY-500-1	AY-500-2	AY-500-3	AY-500-4	AY-500-5	AY-500-6	AY-500-7	AY-500-8	AY-500-9	AY-500-10
Control	AY-500-1	AY-500-2	AY-500-3	AY-500-4	AY-500-5	AY-500-6	AY-500-7	AY-500-8	AY-500-9	AY-500-10
Indicator	AY-500-1	AY-500-2	AY-500-3	AY-500-4	AY-500-5	AY-500-6	AY-500-7	AY-500-8	AY-500-9	AY-500-10
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prescribed series impedance in the plate circuit of the tube, tube and tube also included from present data that the greatest "valent instability" rate on tubes usually occurs within the first 20 hours and may run as high as 15%. Preliminary indications are that "valent instability" is higher in aircraft than in fixed installations or on ship-board, tube rated.

It also revealed that vacuum type tubes have a lower failure rate than transmitting tubes.

► **Future Power Supplies**—Probably all of the military aircraft of the future will generate 600-cycle a.c. as the ship's primary power, although 28 v. d.c. systems will not go out of the picture completely for some time yet. Lt. W. Sherman of the USAF's Wright Air Development Center told the IRE.

Variable-frequency a.c. primary power supplies set on the way out, Sherman indicated, as a result of improved constant-speed drives and the advent of the novel turbo turbine alternator drive.

Sherman presented highlights of the recently adopted MIL-E-1594 spec which spells out military requirements for aircraft power generation systems. He warned aviation designers that in the future they must design equipment requiring more than 900 w. of power to operate from a three-phase source. This is intended to provide reasonably balanced three-phase alternator loads.

The new spec provides for an allowable frequency range of 180 to 420 cps, and an allowable voltage variation of 102 to 124 v. Sherman and Everett, the military hopes to tighten the voltage regulation limits to 105 to 118, but Sherman warned equipment designers not to count on these limits in present designs.

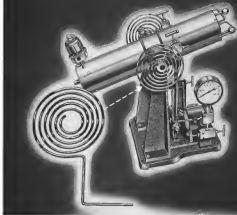
► **Calls for System Make-Up**—Sherman called aircraft manufacturers to construct a complete make-up of their electrical systems prior to building a new airplane. He also urged aviation manufacturers to test their devices with the same electrical power source used in the plane.

(At present, many companies use commercial 400-cps power supplies which frequently have erratic waveforms and regulate their output power supply.)

Sherman also warned aviation designers that their equipment must be able to withstand short exposures to low frequency (150 cps) power when supplied from an engine-driven alternator at such times as engine speed falls below the operating range of the constant-speed drive.

► **Space-Excess Tests**—Systems spin up between two space diversity systems antennas operating in the HF band is

## Windpipe for a peaceful H-bomb



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special windpipe. They had some trouble through tube leakage but that was before they used Superior 304 Cold-Formed Seamless Stainless Steel Tubing. Superior gives them just the flexibility and fatigue strength needed for cyclic operation, plus chemical resistance and burst pressure to spare. Specialty of Superior 304 are more in hand, but longer. And American Instrument reports they're dimensionally uniform, smooth and free from surface imperfections.

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600 ft., M. Aker of the Signal Corps Engineering Labs told the IRE. (A space diversity system is one which uses two physically displaced antennas to obtain maximum signal strength and reduce random fading.)

Aker's conclusion was drawn from post-Signal Corps-Washington, University tests which also indicated that space diversity systems give better performance than frequency-diversity systems. (Frequency division uses simultaneous broadcasting on two or more radio carrier frequencies.)

The Signal Corps experiment with half-wave biconical dipole antenna spacings of up to 2,400 ft., with radio transmission distances of up to 2,000 miles.

Test results showed that the antenna may be oriented either parallel or perpendicular to the direction of the signal with comparable results when 600-ft. antenna spacing is used, Aker reported. The parallel orientation gives slightly better performance at 600 ft., and should be used when conditions limit antenna spacings to 400 ft. or less, Aker said.

A single-antenna space diversity system, with a 180-ft. spacing, gave slightly better performance than a two-antenna system, Aker noted.

Based on frequency diversity system tests using frequency separation of 175 to 1,175 cycles, Aker concluded that "frequency diversity of its best is as feasible as space diversity system" in the HF region.

\*A-1 Ground Position Indicator-A new 60-ft. navigational computer designed to give military aircraft pilots a continuous indication of their latitude and longitude was developed by J. L. Dennis of the Wright Air Development Center.

Developed by Ford Instrument Co., the device requires the pilot manually to set in his starting latitude, longitude, wind direction and velocity, and magnetic variation. The A-1 then continuously computes airplane position from the plane's true speed and magnetic heading, which are fed in automatically.

The device's instrumental error is one percent of the distance traveled, Dennis reported. Operational error may be higher because of unknown variations in wind velocity and direction. However, Dennis said, a no-burn WACB (radio test device) is a small computer error of only 3% using a six-hour wind profile.

Dennis also described briefly a new AN/APA-56 ground position computer developed by Edgett-Powers Division of Bendix Aviation. The device operates in conjunction with the AN/APR-41 navigational radio. The latitude and longitude of the destination are set into the computer and can be changed in the computer, appear on the APS-41

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Bottom picture: Despatch Furnace, a long used for a variety of heat treating of aluminum and other alloys. It is heated by 250 kw electric heater.

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under scope to show replace position relative to the destination.

Dennis emphasized that the AN/AFS-18 computer is highly indeterminate, with 75 of its 15 tubes being of the indeterminate variety. He also noted that there had been no unknown tube failures in almost 1,000 hours of computer operation.

► **Naval Avionics Exhibit**—Judging from the crowds surrounding the Westinghouse Electric Co. booth at the convention, its proposed "rocket interrupter" was one of the most novel displays at the Cloud Control Exhibit. The ribbon played plane was outfitted with a touch-sensitive, non-classified version of the Westinghouse relay fire control system now being set in Korea on the Douglas F1D Skyknight.

Visitors had the opportunity to test their shooting eye by maneuvering the airplane controls to keep a target blob centered in a radar scope. When the operator released a trigger he saw the blob only if the blob was centered on the radar scope. Outside a small tracking device added up the hits scored.

► **Convention Record**—All multiple included papers presented at the 1953 IEEE convention will be published soon in a new publication called the "1953 Convention Record." The Record will be divided into two parts, with each part devoted to one general subject, 16-Fields & Telephony, Automatic & Communications.

Members of IEEE professional groups will receive free a copy of that part of the Convention Record pertaining to their group's activities. Other parts of the Convention Record may be purchased at a nominal charge.

Details and prices can be obtained by writing the Institute of Radio Engineers, 1 East 79th St., New York 23, N. Y.



#### NEW LIMA ILS

"Most modern instrument landing system in Lima, Peru," is what Foreign calls it. Now ILS, recently commissioned at the Lima, Peru, airport. Look for more for new ILS is generated by the antenna array which was installed under contract with Geopac (Peruvian Airport and Communication Aviation Corp.). New ILS will reduce clearance to 200 ft., saving with one-half mile visibility.

AVIATION WEEK, May 6, 1953

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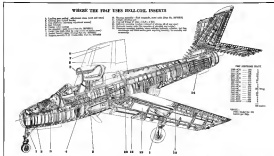
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## EQUIPMENT

### WHERE THE F4F USES HELI-COIL INSERTS

Helicoid inserts are used in jet engine parts, such as turbine nozzles, compressor casings, and turbine casings. Helicoid inserts are used in jet engine parts, such as turbine nozzles, compressor casings, and turbine casings.



## Thread Inserts Protect New Jets

Growing use of 'soft' light metals such as aluminum and magnesium opens way for Heli-Coil applications.

By George L. Christian

Dunbury, Conn.—They metal cast that protect hole threads may not sound glamorous

But they are playing an increasingly important part in strengthening aircraft structures, and saving weight, space and money. Tapped threads in light metals and plastics have been a troublesome detail to designers and manufacturers. The trouble has been subject to wear, strain and corrosion.

One modern supersonic fighter, the Republic F-105, uses 120 patented Heli-Coil inserts, another uses 255. And tests are being conducted with Heli-Coil-equipped aluminum parts in the wing and empennage of Boeing's speedy B-70 Stratojet bomber. If successful, such an installation will reportedly mean considerable weight savings for the airplane (Aviation Week Mar. 30, p. 18).

Because of the aerospace manufacturer's trend to put more load into their planes by using large fittings and components of soft metals (aluminum and magnesium) in place of built-up sheet metal assemblies, the future of such inserts seems assured.

■ **More on Turbojets**—The insert is also gaining favor in jet engine parts, say Heli-Coil officials. They cite three examples:

■ **Wingbolts** can save \$16.20 per F4U-W-22 by replacing compressor rotor bolting with Heli-Coil inserts. And the company's J40 and J46 engines use two to three inserts as easy inserts as the older J35.

■ **General Electric** has jumped its use of Heli-Coil fast to five times in the J71 over the J47. In the forward frame alone the number of inserts has climbed from approximately 90 to 336.

■ **Allison** increased the number of Heli-Coil from a total of 61 in the J35-A-27 to 191 parts in the J35-A-35.

■ **Another major mid-flow turbojet engine** can save \$37.46 per engine (\$399 in material) savings plus 15.45 labor savings by using 35 Heli-Coil instead of solid steel thread bolting with several lock washers.

This is for gear box housing component applications. Weight saving adds up to five pounds.

Cost saving for the entire engine would be \$320, Heli-Coil says.

■ **Master Yee-Heli-Coil** inserts are proving useful on welded structural steel, according to Paul E. Gault, who is the

firm's director of project engineering. Heli-Coil are used on the Nike, designed and developed by Westinghouse and manufactured by the Douglas Aircraft Co. Wolfe said the inserts are used to facilitate the periodic removal and re-installation of equipment which requires inspection and testing during long storage periods.

■ **Rodgers Engines**—An old but important use of Heli-Coil inserts is in replacing openings in reciprocating engines. Wolfe pointed out that from the Whitney Aircraft pioneered this use of the insert and, today, it is being used on reciprocating engines. The latest three principal advantages for Heli-Coil as plug openings:

■ **Weight and space** required for sheet-metal inserts were saved.

■ **Disturbance** was improved, prolonging plug life and reducing vibration.

■ **Corrosion** of plugs in their holes through high heat and carbon deposits was eliminated because smooth insert threads allowed plugs to be removed and replaced several times.

■ **What It Is**—Heli-Coil inserts are "passive formed coils of stainless steel or phosphor bronze which fit the tapped female thread and the screw thread of the steel or alloy." Stainless steel meets Aircraft Material Specification 7245A and phosphor bronze meets AMS 7247A.

The steel inserts are made of 15-5



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GE J47-J25 jet engine uses more than 350 Heli-Coil inserts

stainless steel wire having an ultimate tensile strength of 180,000 psi. This is how the inserts stick up on a Rockwell "C" scale.

• **Insertion tool assembly**—16-47 (patented tool)  
 • **Insertion application**  
 • **Insertion tool set**  
 • **Insertion tool set**  
 • **Insertion tool set**

Heli-Coil inserts are easy to install. Simply drill a hole, tap it, insert the Heli-Coil, and back off the tap at the bottom. The company says. Heli-Coil inserts automatically lock themselves in place.

A special notch in the last coil of the insert facilitates breaking the tap. Tap holes do not require taping (in some) and unthreaded inserts cost 10% less than threaded ones. The Heli-Coil insert is said to be easy to remove. A special tool taps out an old insert in a matter of minutes without damaging threads in the original assembly, to permit installation of a new insert, the company says.

Heli-Coil inserts are available in the widest range of thread sizes applicable to the aviation and marine industries.

### Heli-Coil Saving Study\* JET ENGINE GEAR BOX HOUSING

Part	No. of Inserts	Weight Savings	Cost Savings	Total Savings
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00
AX-1000000	100	10.00	10.00	10.00

**TOTAL SAVINGS PER GEARBOX**

(U. S. 10,000.00) (U. S. 10,000.00)

\*Based on savings estimated by Heli-Coil engineering department in cooperative test of Heli-Coil inserts in solid stress steel housing with standard inserts per APPLICATION. Savings based on comparison of a standard housing per part.



Heli-Coil thread inserts are made of high-strength 18-8 stainless steel wire.



SKETCH shows how Heli-Coil insert (right) induces effect of thread chase.

According to a major aviation manufacturer, The inserts are designed for National Coarse and Fine Thread Series, Unified Thread Series, straight and taper pipe threads and automotive and aviation sparkplug threads. Heli-Coil inserts are made in all standard sizes and lengths. They are available for Class 2, 3, 5 and 8.8.

► **Manufacturer's Survey**—Other conclusions reached by the aviation manufacturer, who conducted a threaded insert survey comparing Heli-Coil to three other types of inserts were:

- Less edge distance is required by Heli-Coil inserts than by the other three.
- Heli-Coil inserts are easy to install.
- Easily distributed across construction as bolts used with Heli-Coil in sets means less thread failures at thread root.
- Lightest in weight of the four inserts.
- Material cost of Heli-Coil inserts was the lowest of the group.

Immediate availability of Heli-Coil proved to be a desirable feature.

► **What It Does**—Heli-Coil engineers told American Worm that the inserts offer these advantages to the design engineer:

- **Weight and space saving**. Smaller loss diameter, smaller, shorter and fewer cap screws, smaller flanges all mean weight, lighter loadings or extensions. Cost and weight of bushings is greatly reduced.
- **Wear saving**. Extra hard, stainless steel inserts protect against galling, wear, erosion or electrolysis between threads.

► **Money saving**. Because Heli-Coil is only an occasionally harder than the cap screws which fit into them, long service ultimate tensile strength is 75%—800 psi. Heli-Coil wire is 150,000 psi (min.), if design occurs, it is the



## A Northrop Prime

Northrop Aircraft's forward-looking, seven year research in the field of guided missiles has now resulted in serial production for the U. S. defense effort.

This advanced weapon to protect free people is a prime development of the aviation and production talents pooled in the Northrop organization.



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cup screw that pulls, not the inert 50-cup screw, whose cost is negligible, is placed, not the inert assembly.

Example of this strong assembly: Boeing B-70 Starliner's fuel cell fittings. Originally fitted with dome nuttype weld bolting with an ultimate tensile strength of 60,000-90,000 psi., the \$34 fittings must be scrapped if bolting is damaged by the toughest cup screws, according to Heli-Coil engineers. If the fittings are equipped with Heli-Coil inserts, their 164,000-psi. tensile strength prevents such damage and resultant jacking of the fitting.

The project is under consideration by Boeing and U. S. Railway Co.

► **Smooth Finish**—Heli-Coil engineers

stressed the smooth, almost glasslike surface of their inserts. The 5-15 micron-inch finish put on Heli-Coil inserts means these advantages, according to company engineers:

- **Less wear** due to resistant heat or carbon deposits is likely to occur.
- **Greater tightness**. Galling action provided to bolt or screw causes less torque dissipation because of thermal drag. Result is much more even distribution of stresses through the entire length of the screw instead of concentration in the first two or three threads. This gives a Heli-Coil assembly considerably greater strength than a conventional assembly, company officials say. Heli-Coil engineers cite this example of the

increased clamping effect due to Heli-Coil smoothness.

In a standard female threaded assembly requiring 145 in./lb. torque, 79-90 in./lb. is dissipated due to thread drag, leaving only 60-73 in./lb. for clamping effect. Stretched AN cup screws are finished to 30-50 micron-inches. In a Heli-Coil-engaged female threaded assembly requiring the same 145 in./lb., only 5-15 in./lb. is lost through thread drag, leaving 130-135 in./lb. for clamping effect. This is without imposing additional stresses on cup screw at start, Heli-Coil says.

► **Service—Importance** advantage of Heli-Coil insert-engaged assemblies is that they may be disassembled and reassembled many times without damage to the female threads, the company says. Even if the insert's threads are damaged, it may be removed and replaced in a matter of minutes by the use of simple tools provided by Heli-Coil.

Such ease of servicing assemblies in the field with a minimum of special or cumbersome tools is proving to be a boon to military and commercial users of the inserts, Heli-Coil says.

► **Industry—Company** spokesmen cite these interests of Heli-Coil Corp. as "the backbone and end two legs in our marketing program."

► **Original equipment**. The company aims to have Heli-Coil inserts incorporated in original equipment at the design stage. To this end, Heli-Coil engineers are prepared to make educational and complete comparative engineering and cost studies showing the material and labor savings to be obtained from using Heli-Coil inserts.

Among other benefits derived are those from a production angle: Prototype designs and manufacturing can save themselves time and production costs of making toolings by substituting Heli-Coil. Rushing production facilities can then be devoted to other efforts.

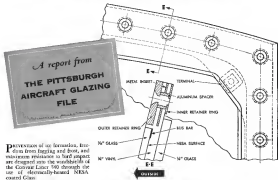
► **Production savings**. Heli-Coil inserts can be used to salvage production loss in tapping threads. Assemblies may quickly be salvaged by using the insert.

► **Aftersales operation**. Use of Heli-Coil on aircraft after they have gone into service is the next target. Used primarily on engine and accessories, Heli-Coil are helpful in preventing maintenance and repair.

Heli-Coil inserts are used to be particularly useful when screws or bolts have to be used with such soft materials as plastics and wood. Additional benefit is derived from use with threaded plastic, where insert is molded right into the plastic form, eliminating all machining operations.



## How electrically-heated "NESA" Glass is used in windshields of Convair-Liner 340



PREVENTION of ice formation, freedom from fogging and frost, and minimum resistance to hard impact are designed into the windshields of the Convair-Liner 340 through the use of electrically-heated NESA coated glass.

These sections show you how Convair engineers and Pittsburgh Plate Glass Company electrical engineers, working together, applied NESA glass to the windshields. The "direct-view" (DV) window on the pilot side is NESA, too.

The NESA windshield consists of two pieces of tempered glass with a vinyl filler between. The inboard surface of the outboard glass is NESA coated and carries electrical current at relatively low resistance between

two bars and terminal. Heat dissipation is about 1,600 BTU/hour/square foot.

Pressure load is carried by the full-tempered inboard glass by vinyl material separating the vinyl to the outboard separator ring, leaving the untempered NESA Glass "free-floating" with as little stress as possible. Gentle warming of the plastic by the NESA coating requires maximum

hard resistance to the windshield. Pittsburgh inboard separates

tees will be glad to assist you with your aircraft glass or glazing problems, drawing upon experience gained in working closely with most of the nation's major aircraft manufacturers. For complete information, write to Pittsburgh Plate Glass Company, Room 3046-532 East Duquesne Blvd., Pittsburgh 22, Pa.



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Clipper Seal being installed in the non-rotating gear box of the Sikorsky HOSS helicopter to seal oil in, keep abrasives out.



Photograph and cross section of Type LFD Clipper Seal. This is just one of numerous seals available to solve tough sealing problems.

## ... seal oil in, keep abrasives out, at critical locations

To assure the lubricants vital to its complex rotor and gear systems . . . and to protect bearings against the infiltration of abrasives . . . the new Sikorsky HOSS helicopter depends on these positive sealing qualities of Johns-Manville Clipper Seals.

**Clipper Seals are flexible**—molded of special compounds, they have a tough, dense body and a soft flexible lip economically molded into one piece.

**Clipper Seals reduce friction**—A specially designed garter spring holds the lip in tight but firm contact with the shaft. Thus a positive seal is always maintained but shaft wear is reduced and gear heating is prevented.

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**Clipper Seals are versatile**—They can be furnished in flange sections of varying widths to fit practically any cavity. Various lip designs are available . . . and various lip compounds provide the proper hardness for temperatures from -65F to +450F.

To find out more about Clipper Seals and their application to your particular sealing problems, write Johns-Manville, Box 66, N. Y. 16, N. Y. In Canada, 139 Bay St., Toronto 1, Ontario.



# Johns-Manville

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such as drilling and tapping.

The Future-Bell Coil works started in Aero-Thrust units, invented by Harold Casperson, an aeronautical engineer. Distinguished by a pen-shaped cross section, Aero-Thrust units were used widely during World War II. Special shape proved to be a handicap because special thread forms on chip screws were required. So cross section was changed to diamond shape to accept conventional male threads and name was changed to Heli-Coil.

Heli-Coil Corp. moved in mid-1951 to Danbury, where it built a plant of 15,000 sq. ft. area. But increasing business has compelled the company to add 15,000 sq. ft. more space, moving operations and already partly equipped.

Original company had six employees and produced \$10,000 worth of products in its first year. In 1951, the company employed 120 in the shop, 54 office personnel and 75 engineering representatives scattered throughout the U. S. and Canada. In the same year, Heli-Coil sold millions of its inserts plus thousands of taps, tools and gauges.



## Optical Tooling Scope

The Optoscope, a telescopic tool designed expressly for jig and fixture location and alignment in assembly plants, has been developed by W. & L. E. Corley, Aeronautics, Inc. for speedy optical tooling use becoming an increasingly familiar sight on aircraft production lines.

This unit was developed with the help of aircraft tooling engineers, according to the firm, and permits jig alignment and coordination within a few thousandths of an inch. It establishes the horizontal and vertical planes required in locating jigs for sectional assembly operations.

The Optoscope's telescope is the cutting edge of a 1 1/2 in. aperture, providing 25X magnification. Resolution is 4 seconds and field of view 1.5 degrees. It will focus to a maximum of 5 ft.

W. & L. E. Corley, Inc., N. Y.

# GREER TOPICS

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GREER LUBE PUMP TEST STAND supplies oil under rigid control conditions of temperature, flow to 30 gpm, pressures to 28 psi, and pump shaft speeds to 8000 rpm. It accurately checks the main oil pump assembly of the J-48 turbojet engine for the Wright Aeronautical Division, Curtiss-Wright Corp.

## Greer Builds Complex Lube Pump Tester for Wright Aeronautical

Precision engineered from ten pages of rigid specifications

to accurately test main oil pump assembly of J-48 turbojet engine

The test machine pictured above is another good example of Greer designed-to-order equipment. In this case, the customer provided specifications in other words, the entire test problem is turned over to Greer engineers who design and build precision equipment to do a specific job.

True-out-of-ordinary problems need good men to solve them. There are good men at Greer with many years of this specialized experience that is difficult to find, people competent to match themselves.

Greer makes many standard test machines, too, that can be ordered right out of a catalog (a free copy sent on request). They are sold through standard machines, they are not made.

produced; each machine is slowly and painstakingly checked, repeatedly tested for accuracy and dependability.

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## NEW AVIATION PRODUCTS



COMPONENTS of Geco's prototype low-frequency automatic direction finder include twin loop antenna (right). Evaluation ADF is to weigh about 50 lb.

### Static Doesn't Bother New ADF

*Low-frequency automatic direction finder (ADF) for airline transports and smaller craft, designed to overcome static problems associated with LF equipment and line-of-sight limitations of VHF sets, is being tested for production by Geco Corp., a subsidiary of General Aviation Corp.*

By Scott H. Reinger

A low-frequency automatic direction finder (ADF) for airline transports and smaller craft, designed to overcome static problems associated with LF equipment and line-of-sight limitations of VHF sets, is being tested for production by Geco Corp., a subsidiary of General Aviation Corp. The \$100,000 equipment is undergoing evaluation tests at the Signal Corp.'s Army Aviation Center at Manassas County Airport, Md., and a prototype is to be exhibited at the Aviation Trade Show scheduled for June 9-11 at the Javits Station, New York. It also is scheduled for severe track by a major oceanic airline.

Production units are expected to weigh about 30 lb—light enough for small Army "jeep" planes—and to be geared compatibly with other airline ADFs.

► **New Double Loop**—A patented "double-loop" antenna (not found in other sets) and a new antenna arrangement set to make this ADF virtually static-free, enabling it to home consistently with an accuracy of one degree, Geco says.

Comparison tests in extremely rough weather show the equipment can hold to a variable bearing indication when other ADFs provide no reliable indication at all, Geco says. Its advantage over VHF equipment lies in its capacity to utilize the low-freq and long-range forces of low frequency transmission, while retaining high dependability and an accuracy at least as good as that of

shorter-range VHF. In the company's view, this makes it applicable to airline use, especially in its oceanic applications where LF has a greater reach than VHF.

Problems exhibited in the set are attributed to overcome LF shortcomings at these sources, not simply alternate them by better shielding and other physical measures, Geco says. The company thinks the design approach as tested at the set will give low noise and LF audio navigation, now covered by VHF.

The development is final, as airlines have been evaluating a somewhat improved interest in LF lately, the company notes.

The big difference between the ADF and others is the use of the double or cross-loop antenna, the single loop in the system commonly used.

Instead of rotating the loop to a null



RANGE TESTING shows results on two loop ADF antenna.

(no signal) point for homing, the Geco system does two loops to a point of nearly maximum signal strength, where static is more easily overcome.

► **Avoiding the Dilemma**—The dilemma of the single loop, as Geco explains it, is that the point of strongest signal covers too great an area drastically to be used for pinpointing with sufficient accuracy as LF range means, while the point of no signal (null) provides a closer indication, but can be read only confused by static.

The twin loop merely circumvents these problems, Geco says. It splits both the use of the null point and the point of strongest signal for homing, but operates in the general area of strong signal to overcome static problems. It seeks for a point where the signal to each of the loops is equal.

The loops are mounted perpendicular to each other, on the same shaft, driven by a bracketed motor. Signals from the range station are picked up equally by each antenna when the direction of the incoming signal bisects the 90-deg angle between the loops. A line connecting the stations from that point splits the balance, causing one loop to pick up more signal, the other less.

► **Better Because**...—Among reasons given for Geco's line guides accuracy and dependability of the two-loop 70.7% signal strength arrangement: ► **Stronger signal** over most oceanic routes; ► **Greater sensitivity** is good at 70.7% of signal strength. A given movement of the loop at this point produces a greater voltage change than at peak signal strength. A characteristic loop phase antenna, which is commonly used at the 70.7% area lies at the peak of the curve.

► **Two loops** multiply displacement from homing point. As one loop reacts closer to the peak, and increases voltage output in its circuit, the other moves further away and reduces its output, widening the voltage gap. Thus, the entire voltage change is the sum of the total of the changes in each of the loop circuits. Difference in loop outputs can be used as two indices of a cross-polarizer indicator which would have equal inputs to cross each other at the center line.

The Geco system depends on amplitude comparison, rather than phase reversal, for homing. The loop does motor steps when the voltage difference is 300%.

► **Speeding**—Antenna—Another major departure in the ADF is noteworthy in that

## Better Products Thru Better Design

*The vision of research scientists is brought to usable reality by the design engineer working with the MICRO Switch engineer*



they open the heavy door at the reach of your hand. One of the largest makers of these door-opening devices for railroad cars, buses and street cars took advantage of MICRO's ability to provide small packaged switch assemblies to perform that function. These assemblies eliminated difficult maintenance problems, were easily replaced... and opened the door better.

There's a new dialing machine in the market so small that it can be carried in the hand and fits into a brief case. Use of two ultra-small MICRO "subminiature" switches contributed in large measure to the small size and high efficiency of this machine. Hardly larger than a dime and weighing but 1 1/16 of an ounce, they give the long-life, trouble-free performance such a product must have.

THE dream now taking form is the minds of research scientists will become the realities of tomorrow.

Who would have realized that the study of cosmic rays would bring about the Atomic Age? Only a few years ago, despite the prediction of numerous scientists. In the last thirteen years, people were amazed at the accuracy and speed of electronic calculators.

MICRO switches have always been a part of the atomic program. Superatomic planes no longer with MICRO switches. They are important components of every amazing electronic device.

What fantastic things are yet to come?

Every day sees new designs made possible by the versatile characteristics of the MICRO switch. Every day sees redesigns, too, that make good products even better by use of these small but dependable switches.

There few brief case instances indicate the degree to which design engineers are convinced that the "use of a MICRO switch is a principle of good design."

When you stroll to the door from your seat on a modern streamlined train, more often than not it is a MICRO switch

MICRO even gives self-control to testle threat. When the helmsman needs nothing on the floor of a well-known manufacturer of testle machinery, a MICRO switch signals the operator in time to avoid thrust breakage. This gives a reliability and consistency to locomotive operation never possible to obtain by mechanical means. The result—better production—safer operation and happier crews.

More and more evidence piles up that "better products than better design" can be a reality when design engineers become aware that "the use of a MICRO switch is a principle of good design."

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stead of continuous use of a strong antenna in conjunction with the loops. This continuous antenna is a weak link in conventional LF nets. Geco says, as it eventually introduces static into the system when static conditions prevail. By looking in the wrong antenna only briefly, static is introduced only briefly. And even this momentary disturbance tends to be canceled out in the dual circuitry, according to the company.

The same antenna determines whether the rings static is ahead of or behind the plane. It does this by introducing a frequency substance in the normally open voltage in the two cir-

cuits (when it is heard) which activates a relay. This reverses the radio coupling to the microphone of the bearing when the plane is flying "toward" the station.

The two-power voltage imbalance, by adding a change in the "in-frame" static, is accompanied through the RF phase and reverse polarity arrangement of the loops in an interplay with the sensing antenna. Radio frequency at one loop is always opposite in phase to the other, one loop supplying plus voltage, the other minus, alternately. For this, the loops change polarity when their position change in relation to the range station.

The most serious problem is a constant reference plane for the loops. It is the movement of the loop and change in its position relative to the range station that alters the relationship in phase and polarity between it and the sensing antenna. Thus, the constant antenna, to supply "to" or "from" reference, offsets the circuit balance, adding voltage to one loop and subtracting from the other, and vice versa, depending on their phase and polarity.

The two-loop circuit, always opposite in RF phase, is also a single balancing circuit, and if voltages are equal they cancel each other in this point, creating a balanced condition to indicate loops are homed.

This also is true of static to which both loops are equally exposed. As static voltage is equal in both loop circuits it tends to cancel out in the balance circuit. This feature is made use with the Geco set, the company claims.

► Set Components—In addition to the antenna, the prototype equipment, subject to modification, consists of a dual ADF receiver and a common oscillator in one housing, a control box incorporating all automatic controls, the radio compass, compass indicator and pilot's switch panel.

The switch panel permits range station selection, manual left/right operation of the loops, a manual check-out of sense and balance controls, and receiver sense antenna and power switches.

The compass indicator, in addition to providing a constant check on accuracy of the radio compass, provides the bearing indication required when operating the loops manually. It also indicates when plane is flying through the zone of silence and indicates slight effects on radio signals.

► Twin Loop Net News—The two-loop antenna is not a recent development. What is new is its application in a direction finder that is completely automatic, Geco says.

The basic set was developed in 1933 by E. J. Scammi Radio Navigation System Co., and was first flight tested in 1934 as part of a manually operated system. Later it could be found in a complete service on a Martin flying boat used by Pan American in trans-Atlantic service, and on DC-3s. Around 1938, it was tested on a craft which flew around the world.

An advance cited for the set is that the principles it employs have been tried and proven in service.

In a statement for American Wings, Dr. Lee De Forest, inventor of the triode vacuum tube, called one of the world's leaders in radio development, and he believes "the two-loop, dual (in-phase) principle of direction find-

ing... is still the most dependable system on LF."

Harry Adair, antenna pilot and aviation writer, now chief pilot for the Miss C. Fleckenstein Foundation, Reno, Nev., gives the account of his experience with the early manual two-loop direction finder: "When all other (LF) radio equipment failed to function because of severe precipitation static and icing, your system (Geco's) continued to operate reliably."

Across the board emphasis on VHF after World War II, and slow-down in adapting the two-loop in an automatic system caused the two-loop system to be temporarily eclipsed, Geco admits.

An automatic antenna finally was developed (by Aerobeam, Inc., headed by J. H. Schochman, in collaboration with E. J. Scammi, president of the original set). But this set was lost when American Airlines' research plane, the Alpha, crashed into Flamingo Bay near La Guardia Field in 1949. Further work was virtually halted until recently, when Geco purchased patent rights to the set and took on Schochman as chief engineer to continue direction of the program.

Geco Corp.'s address is 540 E. 83rd St., New York 21, N. Y.



#### Runway Picture

A hand-adjustable flight card that graphically shows the private pilot his position in relation to the runway in a perspective similar to that provided by costly navigation instruments in larger planes is being marketed by Flight-Aids, Wilmette, Mass.

Unlike automatic navigational aids in transports, with this one-dollar device the pilot must supply the heading information. The card then gives him an actual picture of his position.

Portions of the circular Tele-Runway card are a black strip representing the runway, a 360-degree compass rose, and bearings showing proper quadrant. Right indicators in accordance with FAR 91, the second VFR flight plan sequence and control tower light-gun signals.

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Hughes representative of a military base in the country or overseas (both main only). Compensation is made for traveling and moving household effects, and insured will keep their families with them in all times.

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## ALSO ON THE MARKET

Fluorizing coatings monometer suitable checks electrical circuit elements with one read of dialled apparatus, mounted along center line and at right angles to work, and permits direct reading to 0.0001 in.—Sheffield Corp., Dayton 1, Ohio.

Self-contained lead wire unit can be operated on very dull pins to permit high-speed tapping of holes, even through top steel and punch are not the case.—Edna Tool Co., Inc., 394 Johnson Ave., Brooklyn 7, N. Y.

Metalizing of ceramic materials for attachment of metal parts is accomplished by new AVIS process. It is said to provide units that stand up over a wide pressure range, withstand temperatures as high as 1500°C and possess JAN thermal shock requirements.—Advanced Vacuum Products, Inc., P. O. Box 157, Southport, Conn.

Ribbon heat tape can be wrapped around tubing and fittings to maintain liquids in water, hydraulic and solid fuel systems at desired temperatures.



Analysis unit at the top water in pipes leading to wastewater from (Framing—Air Associates, Inc., Veterans Air Terminal, Veterans, N. J.)

German Schenck balancing machine will detect displacement of coils 0.0001 in. from center of gravity. It shows amount and location of dynamic and static unbalance in rotating parts (weighing from a few ounces to over 100 lbs.) on motor with electrical measuring system that uses an electronic tube as oscillator.—Carr Corp., 405 Lexington Ave., New York, N. Y.

Welding machine can be used for precision cleaning and beading, welding small parts, such as valves, pistons, rods, dies, glass and rubber seals, and for welding other soft types of metals in aluminum. First work shows long distances to tolerance within .0001 in.—American Welding & Equipment Co., 1001 S. Byrd St., Mobile 4, Ala.

# Field Engineers

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There is an unparalleled opportunity for men with a College or Technical Education Training and a sound background in electronic engineering. The training and experience provided will open up increasing opportunities for earnings and advancement in the fast approaching age of jet air transportation.

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and Mac to cooperate in proposals arising from the investigation.

- **Christmas Air Service**, certificated non-scheduled service, suspended.
- **Alaska Island Airlines** has merged with Alaska Central.
- **U.S.-Alaska Route**—The intra-Alaska merger investigation is a separate one from the Western PNA-Alaska Airlines merger proposal, which CAA is considering in the "States Alaska route to reveal case."

Northwest Airlines U.S.-Alaska certificate issued up for renewal Dec. 16 and will be reissued with Pacific Northwest and Alaska Airlines in the case.

CAA chief examiner Francis Brown is handling both investigations.

United, Air Lines is expected to increase its merger, proposing itself as an alternative to Western Northwest. CAA may propose such merger.

CAA still is expected to favor merger of PAA and Alaska with a larger airline on these grounds:

- **Small routes**—Pacific Northwest and Alaska have little equipment, complete maintenance and service. This causes high unit costs for the carrier, reduced, but CAA officials on the records of PAA and Alaska say improving.
- **Trans-Canada routes** of these parent Alaska-Norfolk-Portland stay does not top the major western airlines. This is an argument for merging them with other Western airlines.
- **Connectivity** of Westerns or United with Pan American and Northwest would be greater than the parent airlines.
- **Western route**—CAA has favored expanding service of the small regional through merger and interchange.

## PAA '52 Revenues Top \$205 Million

Pan American World Airways reports highest gross revenues of \$205,244,000 for 1952, with net earnings \$6,673,000 after federal income taxes.

This compares with operating revenues of \$159,964,000 and net earnings of \$5,946,000 in the previous year. New lines also were advanced last year in revenue passenger-miles, which reached 1,687,000,000, and cargo ton-miles, which hit \$1,617,000. The number of passengers carried in 1952 increased 31% over the previous year to 1,425,000. Average passenger trip was 1,167 mi. In 1951 the carrier transported 43,000,000 cargo, 24,000 freight-PNA flights and 1,500 on leased, the world service. The carrier says 25% of all service travel is from the continental U.S., including ship passengers, is carried by its own airlines.

Equipment for new equipment last year totaled \$29 million.

## Viscount Service

- **BEA starts turboprops on scheduled flights.**
- **New transports cut route time by 20 min. to 1 hr.**

(McGraw-Hill World News)

**London-Victoria Viscount 781s** are cutting 20 min. to one hour from flight time on British European Airways routes, the first in service to use turboprop transport.

Introduced simultaneously with the introduction of new tourist class on virtually 95% of Europe's air routes, the 48- and 67-seat Viscounts are flying BEA's London-Rome-Victoria-London service five days a week. Twice weekly turboprop flights to Cyprus and daily services to Zurich and Geneva are scheduled to start soon. By July, daily Viscount service will start to Copenhagen and Stockholm.

BEA is flying five Viscounts, has 21 more on order. Deliveries are expected at a rate of about two every three months.

Powered by four Rolls-Royce D501 Dart turboprops, the Viscounts cruise slightly faster than 300 mph, can maintain a top speed of nearly 340 mph. Running time on BEA's services will be cut from 20 min. on charter runs to an hour on the London-Stockholm run.

**London-Rome**—To fit the kind of service a passenger can expect in turboprop, BEA's *Avianova* "Wine Bar" on a passing flight to Rome. The 310-mi. flight now made in 3 hr. 36 min., compared to scheduled time of 4 hr. 10 min. for conventional propellers. The cruise flight will be completed in 10 min. less time. Scheduled Viscount flights to Rome will be quoted at 3 hr. 40 min.

There is practically no vibration while flying in a turboprop aircraft. No corresponding jolt air in the Dart engine, eliminating many bumps and making the travel procedure a much quieter and more comfortable process.

**Scheduled flight**—In the air, noise over the wing and aft in the Viscount's fuselage is actually lower than any piston-powered type now in general use—but not as low as the piston jet. Outside the aircraft, there is a marked increase in noise, approaching normal Conquest or DC-4 levels. Even here, absence of the pulsating droning of a piston engine is welcome. The four Dart engines aren't quite synchronized, but it takes a sensitive ear to pick out the beats.

The climb to cruising altitude, usually 21,000 ft., takes about half an hour.

On the London-to-Rome flight, a readily apparent change was noticeable when passenger service was turned on. On the return trip in a different aircraft with new soundproofing, this noise was damped and the general noise level was reduced some further.

Climbing at altitude is smooth but not up to the dramatic efficiency of a Conquest engine at its altitude of 41,000 ft. Lack of vibration in the Viscount is fairly evident from the cockpit to the rear.

**Conventional Comfort**—Inside the fuselage on the 48-seat 781 the passenger enjoys conventional comfort increased by a better low-average view from large oval windows. But in the 67-seat tourist version, the cabin is quite crowded.

**Some are unsatisfactory aspects:**

- **Center aisle** is cut to one-way traffic.
- **Crew**—BEA officials say it is too bad the spacious fuselage of British European's *Elizabeth* jet Harland Air Transport (transport couldn't be adapted to the Viscount).

**Engine**—Rolls-Royce 50 mi. from Rome the pilot begins his lecture. As on the Conquest (which starts its lecture 230 mi. out), the two exhaust engines are shut, introducing a mild turbine whine into the cabin. During the climb to altitude, passengers in window seats are liable to get a slight shaking from condensation forming around the windows.

Each Viscount window is designed as an escape hatch, affording the Viscount more room than any other aircraft now in service. Two oval portholes are equipped by a rubber gasket, a window mechanism and a large handle allow the windows to be pulled into the cabin or retracted.

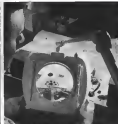
**Weight**—Rolls-Royce takes only one minute from the start of liftoff to the approach of the safe climb. With 52,000 lb. maximum landing weight, the Viscount needs 150 yd. of runway. Compared to many other aircraft, the aircraft took only slightly more than half the runway.

Airline from economics, absent of turboprop flight isn't likely to diminish the desirability of jet air transport for passenger comfort. But reduction of vibration by the Viscount is a big selling point in that it leaves travel happy.

Automatic structure of the turboprop, runs of 300 mi. and less are better than piston-jet jet operations. Total fuel consumed on the flight to Rome (310 mi.) was 1,637 gal. 47 passengers were carried. On a similar schedule, the four Dart engines would require more than 1,390 gal. were used.



C-57 SIMULATOR (instructor's cockpit) depicts actual plane's cockpit.



MALDIN TING GLASS is used for position work on other



FUGHT DUPLICATES on assembly line at C-W Electronics Division



INPRECISE WIRING being tried on AF 878 simulator

## Three Airlines Buy Transport Simulators

Growing demand for electronic flight simulators is exposing airline training and cut costs may well bring a new batch of multi-million-dollar entries from airlines. Air Force and Navy. At least two major airlines are acquiring with the Curtiss-Wright Corp., and Pentagon sources indicate there will be an increase in the directly strong emphasis on military simulation training.

In addition to numerous tactical air combat simulators, orders for transport type are in a strong upward. Types delivered or on order, and buyers:

- **Douglas DC-48**, United Air Lines and Air Force.
- **Boeing 377 and C-97**, Pan American World Airways, Civil Aeronautics Administration, Air Force and British Overseas Airways Corp.
- **The Hardhead Jet**, General, BOAC.
- **Convair-440**, United and Air Force.
- **Douglas C-124**, ordered for Air Force delivery this month.

Eastern Air Lines and Trans World Airlines, Constellation and Martin operations, recently ordered the complete Curtiss-Wright "flight duplicators" simulators costing about \$135,000 each (purchased with about \$775,000 for a flight simulator). TWA and Eastern previously have refrained from buying simulators because there have been no military orders to provide the way to quicker, lower-cost delivery to airlines. The duplicator is a modern version of the World War II "Link Trainer" of Link Aviation.

Other airlines seeking flight duplicators: Pan American, Air France and TWA. Air Force also has purchased duplicators.

"Rollie air" attachments further discuss use of both simulation and general training. U.S. Eastern, PAA, TWA, American Airlines, Air France and the Air Force have bought them.

• **CAA** promotes simulation—To es-

source passengers, CAA recently told the airlines they can save immediate loss as low as about half the required flight pilot check on a month's refresher proficiency tests.

CAA further indicated that DC-48 flight trainers could be used for DC-48 and Super Constellation or Constellation, or vice versa. Military training psychology and simulation manufacturers deploy any equipment with true simulation.

The Doublet Airport Commission and new CAA administrator Fred B. Lee have called flight simulation one of the most important developments for the safety improvement. In the simulation, an airline can train crew on problems and emergencies too difficult or dangerous for real flight practice.

• **Equipment**—

Lee told AVIATION Week the manu-



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later than is especially valuable for training on takeoff and landing. He noted that landings and takeoffs represent the 95% of all accidents, according to research of Ben Thomas, a leading test pilot and design consultant.

► **High Cost—Airline** orders for aircraft are slow in coming because of the high initial cost—mostly in such as the price of aircraft or insurance. But passengers agree the airlines cost is less than inflight training because of:

- **Accident prevention.**
- **Lower cost operation.** estimated at \$25,575 in large jet training deposits, compared with \$180 and more aircraft time.
- **Routine saving.** by having pilots previously devoted to training.

► **ATA Study—Airlines** have been considering how to replace World War II Link navigation trainers as they near exit. Also the DoDable Commission agreed current to buy simulators a year ago instead of waiting as in the training device. Air Transport Association's chief pilots committee set up a liaison group last July to study requirements and recommend specifications for an actual commercial training device.

The ATA committee came up with specs for a computerized device more elaborate than current navigation trainers but without the actual flight characteristics of a live simulator. The group proposed a two-seat, two-engine navigation trainer with complete engine, fuel, control and radio instrumentation. Cost: \$180,000 to \$160,000 each, depending on production specifications and quantity of orders.

## **Dissenting Opinion**

Civil Aeronautics Board members Joseph Adams and Jack Levin last week were drafting a dissenting opinion strongly critical of a majority decision to compromise the ground rules surrounding (Aviation Week Apr. 21, p. 91).

Elmer Denney, who held the balance, changed from a position may vote for continuing full-scale investigation to a final vote for the most of the findings and arguments and resolving with a modified order—ignoring what Oswald Ryan and Clara Gossage.

The Leo-Adams dissent probably will imply that the majority decision makes the Board a "captive" of the industry it is supposed to regulate. It probably will say that if the Board does not stand up to the airlines as an investigation of facts and findings there is little chance of the present inquiry ever changing into without airline consent.

Ryan and Gossage want Denney to their side on the contention that a steel survey without approval will get the same facts and provide more recommendations faster and cheaper.

tion specifications and quantity of orders.

Airlines still are studying the ATA committee's proposed specifications.



**ANSON CARTER FIELD DEDICATED**

Helicopter view of dedication ceremony held recently at Anson Carter Field (N.Y. World, Tex. International Airport) shows the administration building and finger like plane landing platforms. Behind the terminal building is a heliport. Construction

included display of commercial and military aircraft. A Lockheed FTV Neptune and Chance Vought P7U Collier are in the foreground. A giant Conquest 8-56 also was present. The new 1,700-acre field, opened for service Apr. 26.

## **SHORTLINES**

► **As Transport Area** general counsel S. G. Tipton asked House Committee on Public Works to exclude aviation from gas and oil taxes from proposed trust fund for highway purposes, and to certify them instead to the Treasury as an effect to federal surveys expenditures.

► **Alaskan, Ltd., British** all-cargo line has rights to operate until Mar. 31, 1960, from London to New, Taipei, Keelung, Bagdad, Baku, Kermel, Dhahran, and Tehran stops at New, Miami, Rome and Athens.

► **Allegiance Airlines** passenger revenue in March gained 30% to \$123,000. First-quarter revenue: \$349,990.

► **British European Airways** reports fiscal 1959/60 traffic to Feb. 28 gained 21% from the year before, "despite the biggest winter in the history of civil aviation."

► **Australian National Airways** denies potential concern it considers spelling the airline business. Australian transport report ANA's agreement with the government-owned Trans-Australia Airlines is working smoothly.

► **Central Airlines** has signed CAA for a new route Link-Rock-Talon.

► **Civil Aeronautics Administration** has set out of the Aeronautics Guide from \$5 to \$4.75, effective immediately. CAA has established a single standard for aircraft testing signs at large and small airports. It is in Technical Standard Order M-33.

► **Colonial Airlines** has started daily Constellation service New York-Boston using Eastern planes.

► **Eastern Air Lines** reportedly has ordered six new Lockheed L-1011s, each up 22 in order—in addition to the 14 regular 1960s already operating.

► **LAW, Venerable** airline, plans direct Constellation flights to Madrid, Lisbon and Rome.

► **National Airlines** reports passenger traffic Jan. 8-Apr. 15 this year gained 48% from a year ago, and Fugate Bend budget vacation hours are "lower than double last year's sales at this time."

► **Northwest Airlines** last week started flights "every hour on the hour" between Chicago and New Orleans.



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## Ernest Korsch

Saber players must learn how to act as sportsmen and displaying mercy across under different high-stakes visibility conditions and also to keep an eye on MIG bases in the Aegean complex south of the Yöle. As there are no competing making such brackets in the Aegean complex, it is not clear whether the Aegean complex has a significant shareholding publicity in the popular Korean saying "Nothing's too good for our troops... and their pit what we're getting".

Mih Gen Samud E. Andromeda, CG of the 6th AF, with headquarters at Garswell AFB, is replacing Lt Gen Glenn O. Barren in head of the 5th AF in Korea. This may mean that the 5th AF will have a more direct role in the Aegean complex because the SAC itself are based in Korea. By 20% on Korean momentum from here on Japan and Okinawa and its under Far East Bomber Group, now 5th AF.

Some wonder if SAC replacement for Barren, whose 5th AF has been a leader in the fight for the lightweight air superiority

### DD Views on Jobs

[illegible]

## AVIATION CALENDAR

May 14-21—Fifth National Mental Health Exhibition, Convention Hall, Philadelphia  
May 14-22—Aviation Seminar, National Fire Protection Assn. annual meeting, Palmer House, Chicago

Sept. 5-13-1961 SNAZ Convention Year  
Flying Display, Farnborough, Hampshire,

## AVIATION WEEK—MAY 4, 1953

[illegible]

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## Startling Intelligence Innovation

Gen. Mark Clark's offer of \$100,000 and refuge to the first Red pilot who will deliver a MiG-15 fighter to the American is a startling innovation in psychological warfare, propaganda, and intelligence methods. It is to be hoped it marks the beginning of a more realistic policy. The \$100,000 price seems high. The difference between \$5,000 and \$100,000, most hardly be comprehensible to a Yankee who may never have seen as much as five dollars, or its equivalent, at any time.

Nevertheless, if we get a late-model MiG, intact, it may be worth the price. If we don't, we will have the satisfaction of suspecting we have tossed another source of distrust into the Red flying lions who will be eyeing their fellows as closely as the G.I.N. flyers they are sent out to fight. What can we lose by trying?

The Clark offer, as dramatic a break as it is with routine and unimaginative procedures, is not original. The United Press reports an Allied pilot suggested offering a reward a year ago, and a flurry of newspaper stories recently outlined a group of Maryland citizens with financing the escape of a Polish MiG pilot to Denmark in March. Danish authorities, acutely embarrassed to find themselves in the middle of a delicate East-West men's deal, obviously denied the Americans' story. This European MiG, described in American West as an older version than the jets now fighting in Korea, was later shipped back East after a thorough inspection by War zone officers. We still don't have a flyable MiG.

There also was an opportunity three years ago to make a serious effort to win a MiG over to the side of the free world, as reported elsewhere in this issue. At that time an Air Force general in Europe reported an offer received from a Czech pilot to deliver a MiG-15 for \$10,000 and political asylum. This was in 1950, before the three-national fighter had even appeared in the Far East. We still don't have a flyable MiG.

But even if the Clark offer is not as original as it is almost breath-taking to those who are accustomed to the traditional methods of conducting military intelligence work.

According to all of those we respect and consult on such matters, our intelligence people still know pretty little about Russian matters. This opinion was reinforced the other day by the most reports of an technical intelligence officer in a closed meeting in Dayton, between the Air Materiel Command and top public relations executives of the aircraft industry. Several industry men left this meeting astonished at the meager data we have on the Russians.

Why is that? There are many reasons, most of them tied to the problems inherent in government organizations, methods and limitations. Government always tends to be more inefficient than the better examples of business or private enterprise. Military intelligence not only contends with the usual problems of civilian bureaucracy,

but it has the added burden of the military, as well.

So we find military intelligence continuously fighting "the system." This is complicated, conservative, slow-moving, subject always to agency politics and political considerations in reaching funds. Leadership changes frequently, and is more often unenlightened and inexperienced than not. Five of second and third century education is lower than it should be and does not attract as many capable men as the importance of the job require. For the average well-trained personnel, it is often just another assignment, demanding little in experience and ability.

So we have the great United States of America depending for vital information—some of it life-or-death important—on military intelligence services that are woefully inadequate in staff, gear, edit, interpret, evaluate and communicate facts to the leaders who have the power and responsibility to take prompt overt action where necessary.

We doubt if bureaucratic personnel and methods will ever be adequate to do the job alone. One system that works in the newspaper city room or news wire service rather than a precinct for democracy, those, unbridled data merely copied into periodicals, or mass of mass printed or already known data. Why not staffs of well paid, keen operators, trained engineers and capable analysts who know what they want, do plenty of traveling and interviewing, and know what they have when they get it?

It is a high time we streamline military intelligence, catch up with the press and get far ahead of it, so the slush of slushings are unnecessary, stop writing a lot of the voluminous reports—nobody reads them now, nor does anything about them contents if they do—the staff is too old, take action on those unsatisfactory reports on Korean equipment, somehow, find a way to complete the aerial of the country needs.

## Giving Fun a Bad Name

We have admired the ingenuity of one of the trans-Atlantic steamship lines in trying to "sell" the slow pace of their lumbering guests. "Hill the fun is getting there," the ads say.

But apparently the public doesn't relish having the remaining 90% of their fun just waiting back.

The New York Times reveals "an unexpected and negligible development in trans-Atlantic travel has major North Atlantic steamship companies offering accommodations during the peak tourist travel season."

The "unprecedented" bookings only in the year have tapered off, cancellations have been heavy.

In the coming year, the ship sets are quoted on all kinds of theories for this "surprising sharp" except on the airplane.

New York airline circles say they're having no sleep. Business is terrible, few cancellations. Maybe the steamship lines are giving fun a bad name.

—Robert H. Wood

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# Sound Advice

## safeguards jet engine parts

*FINGERS OF SOUND probe metal parts for hidden faults as Allison engineers use the Ultrasonic Reflectoscope*

It is important that the metals used in critical jet engine parts be completely free of even the tiniest flaws. To eliminate the possibility of minute defects that even X-ray testing will not reveal, Allison engineers rely on an *ultrasonic reflectoscope* to test parts.

Allison was the first aircraft engine builder to use this unique means to search out subsurface faults. Here's how it operates: High frequency sound waves are sent into the metal part under test, and flaws of a rejectable nature cause "echoes" which are electrically recorded on a screen. This "sound advice" enables Allison to detect hidden imperfections that could not be discovered any other way.

Tests like this are another reason for Allison leadership, because they are typical of the thoroughness that pays off in greater dependability and has won the confidence of jet pilots of many nations.



*Several engine pieces, like this J33 compressor, receive 100% Ultrasonic inspection*



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